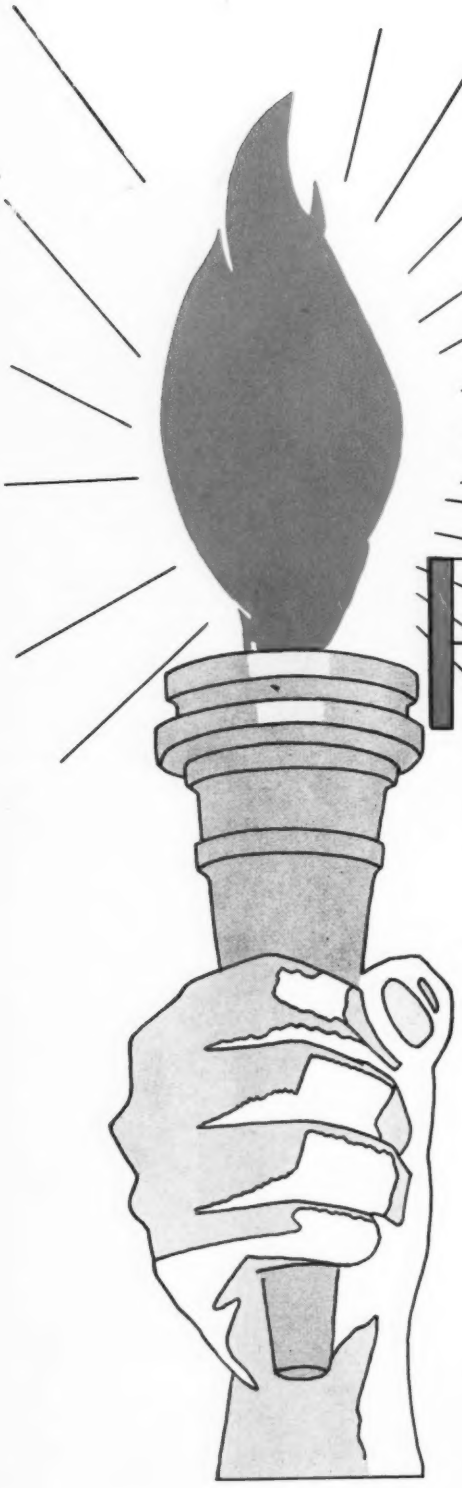
The MINING CONGRESS JOURNAL

SEPTEMBER
1936



A PLEDGE

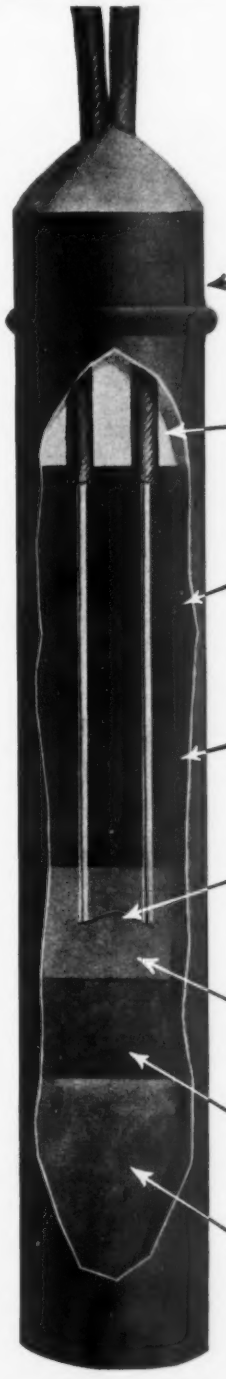
. . . For 22 years The Mining Congress Journal has paced the field and led the way to the great market of a basic industry. . . .

. . . We view these years with a certain feeling of pride in a service faithfully rendered. . . .

. . . We look forward into the future with a determination to maintain the high standards that have won for us so large a measure of good will and confidence in the mineral field with their associated enterprises. . . .

. . . A pledge, then, to continued service at high standards. . . .

The Mining Congress Journal



CROSS SECTION SHOWING STURDY, DEPENDABLE CONSTRUCTION

COPPER SHELL
Carefully annealed to prevent cracks. Dipped in lacquer before loading for detection of "pin holes."

SULPHUR SEAL
Specially compounded sulphur. Will not corrode copper nor eat insulation on leg wires.

WATERPROOFING
Efficient waterproof compound. Sticks to shell and leg wires, thus preventing moisture from creeping along leg wires and shell. Will not shrink in cold.

PLUG
Holds leg wires precise distance apart, relieving possible strain on bridge wire.

BRIDGE WIRE
Amazing example of precision manufacture. *Fifteen ten-thousandths* of an inch in diameter. Composed of four alloys to give right resistance to assure positive, dependable detonation.

IGNITION CHARGE
Ignites when bridge wire fuses. Will not corrode bridge wire, soldered joints or leg wires.

PRIMING CHARGE
Dense, powerful explosive that insures detonation of base charge at maximum velocity.

BASE CHARGE
Detonates at highest velocity of any commercial explosive.

DU PONT ELECTRIC BLASTING CAPS

Insure Complete Detonation of Your Shots

MONEY and time are required to prepare a shot. Don't risk losing both. Use an electric blasting cap that insures a complete detonation.

Du Pont Electric Blasting Caps are precision-built and sturdily constructed to withstand handling in use and transportation; long storage, and submersion in water. They are the world's largest-selling electric blasting caps. More than Nine Hundred Million have been used in the past twenty-five years.

E. I. DU PONT DE NEMOURS & CO., INC.

EXPLOSIVES DEPARTMENT, WILMINGTON, DEL.

BRANCH OFFICES: Birmingham, Ala.; Boston, Mass.; Chicago, Ill.; Denver, Colo.; Duluth, Minn.; Huntington, W. Va.; Joplin, Mo.; Juneau, Alaska; Kansas City, Mo.; New York, N. Y.; Pittsburgh, Pa.; Portland, Ore.; Pottsville, Pa.; St. Louis, Mo.; San Francisco, Calif.; Scranton, Pa.; Seattle, Wash.; Spokane, Wash.; Springfield, Ill.; Wilkes-Barre, Pa.

DU PONT
REG. U.S. PAT. OFF.

EXPLOSIVES

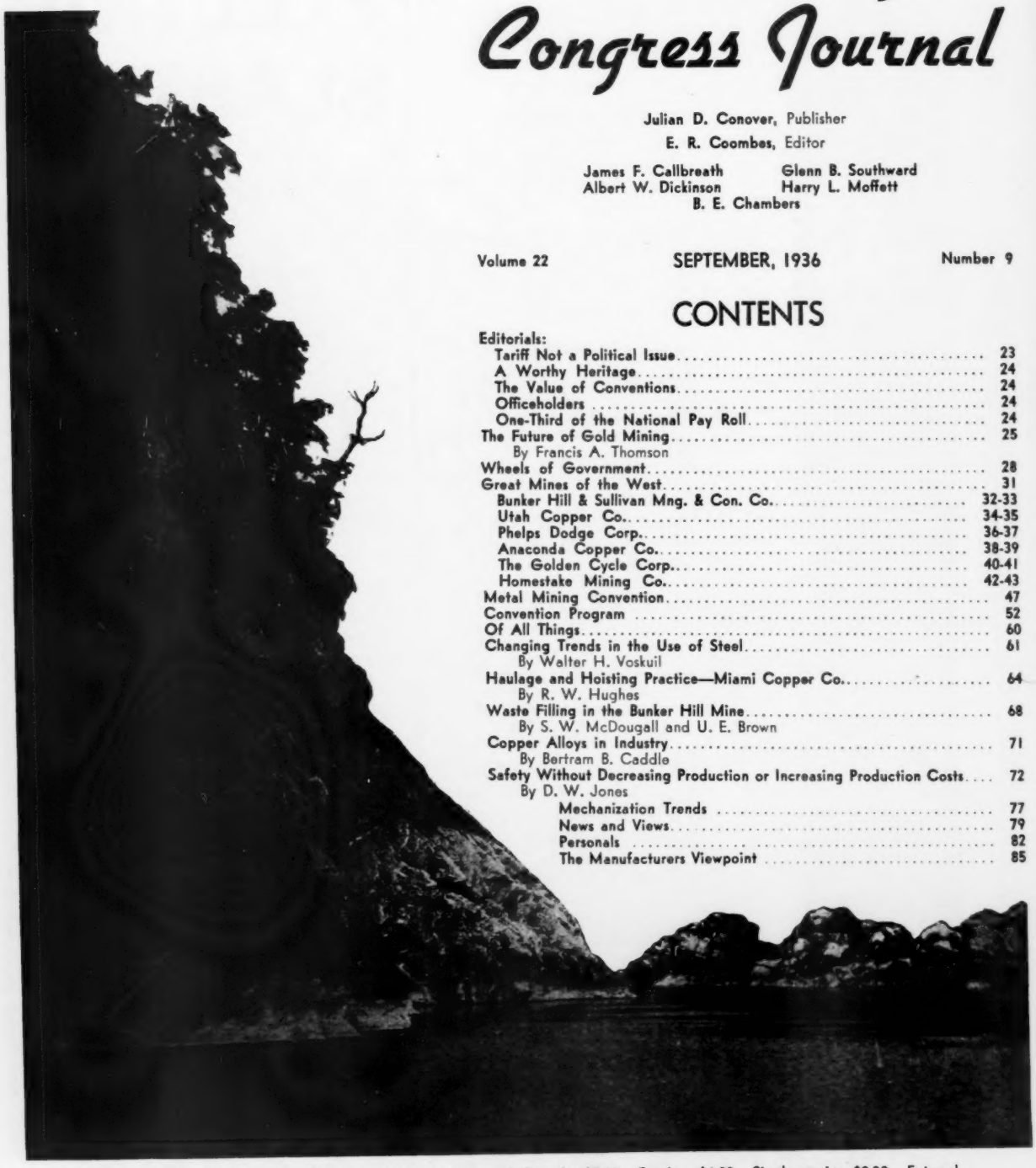
and Blasting Accessories

The Mining Congress Journal

Julian D. Conover, Publisher
E. R. Coombes, Editor

James F. Callbreath — Glenn B. Southward
Albert W. Dickinson — Harry L. Moffett
B. E. Chambers

Volume 22 SEPTEMBER, 1936 Number 9



CONTENTS

Editorials:
Tariff Not a Political Issue ... 23
A Worthy Heritage ... 24
The Value of Conventions ... 24
Officeholders ... 24
One-Third of the National Pay Roll ... 24
The Future of Gold Mining ... 25
By Francis A. Thomson
Wheels of Government ... 28
Great Mines of the West ... 31
Bunker Hill & Sullivan Mng. & Con. Co. ... 32-33
Utah Copper Co. ... 34-35
Phelps Dodge Corp. ... 36-37
Anaconda Copper Co. ... 38-39
The Golden Cycle Corp. ... 40-41
Homestake Mining Co. ... 42-43
Metal Mining Convention ... 47
Convention Program ... 52
Of All Things ... 60
Changing Trends in the Use of Steel ... 61
By Walter H. Voskuil
Haulage and Hoisting Practice—Miami Copper Co. ... 64
By R. W. Hughes
Waste Filling in the Bunker Hill Mine ... 68
By S. W. McDougall and U. E. Brown
Copper Alloys in Industry ... 71
By Bertram B. Caddle
Safety Without Decreasing Production or Increasing Production Costs ... 72
By D. W. Jones
Mechanization Trends ... 77
News and Views ... 79
Personals ... 82
The Manufacturers Viewpoint ... 85

Published monthly. Yearly subscription, United States and Canada, $3.00. Foreign, $4.00. Single copies, $0.30. Entered as Second Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.

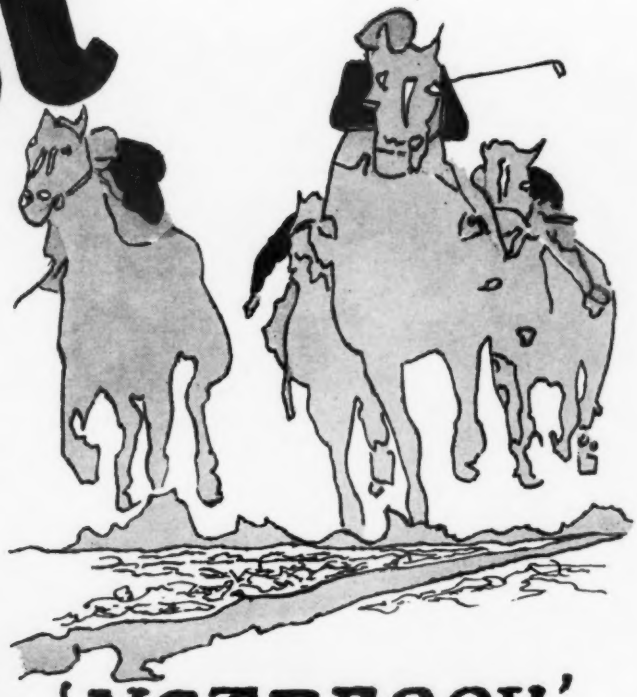
Contents Copyright 1936 by

THE AMERICAN MINING CONGRESS
309 Munsey Bldg., Washington, D. C.

Howard I. Young, President — John B. Putnam, Vice President
David D. Moffat, Vice President — Donald A. Callahan, Vice President
Julian D. Conover, Secretary

Roebling...
The pacemaker in
wire rope development
JAR
THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.
This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.
John A. Roebling's Sons Co., Trenton New Jersey

1st



'YEARBOOK' PAYS 3-1

YEARBOOK on COAL MINE MECHANIZATION

Coal Operators Committee Reports
Annual Coal Convention Papers
Complete Statement on Exposition

Before you plan further modernization of your property study this book carefully. It is a most important aid to efficiency and economy in the application of machine methods to coal mining. The most successful means devised for meeting all conditions are presented to you in a careful and unbiased manner.

Place your order TODAY. Address: 309 Munsey Building, Washington, D. C.

THE AMERICAN MINING CONGRESS

EQUIPMENT

That Has Helped Make The Great Mines of the West

YOU HELPED
This O-B Mining Equipment

MILLIONS of tons of ore to be moved! That's the problem of metal mines. Long hauls, steep grades, sharp curves—none of these obstacles must "bottleneck" the electric haulage system. Ore must be moved quickly and continuously if production is to be kept at peak efficiency at all times, if costs are to be held at an absolute minimum.

O-B's engineers understand this problem. And, with the help of operating men right at the mines, they design dependable, trouble-free products. That's the big reason metal mines in all parts of the world are standardizing on O-B line materials, rail bonds, locomotive equipment, and safety and control devices.

If you plan to attend the Metal Mining Convention in Denver be sure to see the cost-reducing devices O-B has developed for metal mines. If you can't attend send for O-B Catalog No. 21. It will pay you to study carefully the complete line of equipment which is available for making your production more profitable.

OHIO BRASS COMPANY

MANSFIELD, OHIO

Canadian Ohio Brass Company, Ltd., Niagara Falls, Canada

1855M

Universal Mine Hanger
A Combination Feeder Wire Sling and Trolley Clamp
Security Feeder Wire Insulator
Suspension Assembly of a Bulldog Expansion Bolt, Universal Hanger and Bulldog Clamp
The Bulldog Clamp
The MBC Frog, for Main Haulage Lines
Bulldog Trolley Wire Splicer

SPECIFY O-B AND YOU S

DESIGN

O-B PRODUCTS
***for* METAL MINES**

FROGS
SPLICERS
HANGERS
ADAPTERS
WIRE CLAMPS
EXPANSION BOLTS
SECTION INSULATORS

RAIL BONDS
WELDING MACHINES

HEADLIGHTS
TROLLEY SHOES
TROLLEY HARPS
TROLLEY WHEELS

MOTOR STARTERS

COMBINATION FEEDER AND TROLLEY FITTINGS

FEEDER INSULATORS, FITTINGS AND SWITCHES

INSULATORS, FITTINGS AND POLE HARDWARE FOR TRANSMISSION LINES

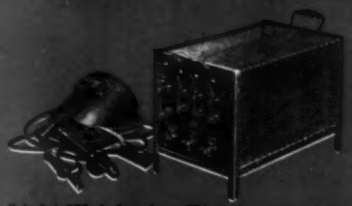
Dual Suspension Clamp, for Holding Both Feeder Cable and Trolley Wire

Type M-3 Section Insulator Switch

Heavy-Duty Trolley Shoe and Harp

Main Haulage Locomotive Headlight, the Type MS

Long-Life Trolley Wheel



Light-Weight Arc Welding Machine

AW-13 Rail Bond, Applied by Steel Arc Welding

SPECIFY DEPENDABILITY

MANY WESTERN MINING OPERATIONS Rely on LINK-BELT EQUIPMENT

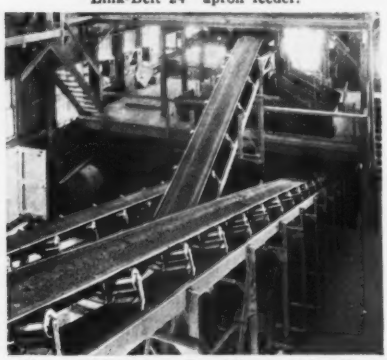
The Argo Mill, Idaho Springs, Colo. Link-Belt apron conveyor which handles ore from mill bin to primary jaw crusher.

LINK-BELT elevating, conveying, screening and power transmitting equipment is synonymous with dependable and economical performance. It has stood the test of time by years of efficient service in the mining industry throughout the world. Send for 1024 page engineering handbook—Catalog No. 600.

Shenandoah Dives Mining Co., Silverton, Colo. Link-Belt 24" apron feeder.

Shenandoah Dives Mining Co., Silverton, Colo. 225-ft. long Link-Belt anti-friction belt conveyor.

Chain-O-Mines, Central City, Colo. 190-ft. long Link-Belt anti-friction belt conveyor.



Climax Molybdenum Co., Climax, Colo. Four Link-Belt anti-friction belt conveyors.

Humphreys Gold Corp., Denver, Colo. Link-Belt portable screening and scrubbing placer gold recovery unit. Excavating is done by two Link-Belt draglines and one Link-Belt shovel.

Homestake Mining Co. Two Link-Belt anti-friction belt conveyors handling gold ore from cone crushers to storage bins.

LINK-BELT CONVEYORS

LINK-BELT COMPANY 5409-B

Chicago, 300 W. Pershing Road Denver, 521 Boston Bldg. San Francisco, 400 Paul Ave.
Los Angeles, 361 S. Anderson St. Toronto, Eastern Ave. and Leslie St.
Export Sales Office: 2680 Woolworth Bldg., New York, Cable and Radio Address "Link-Belt"

THE MINE AND SMELTER SUPPLY CO.

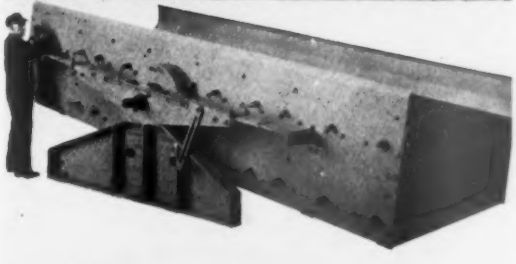
DENVER · SALT LAKE CITY · EL PASO

are now the exclusive Robins representatives for the Rocky Mountain States

FOR BETTER and QUICKER SERVICE

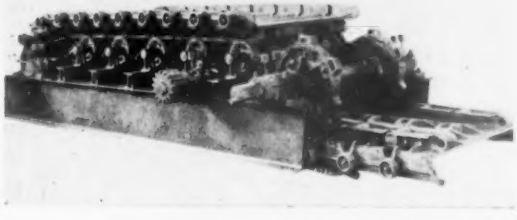
ROBINS *Belt Conveyors*

have been chosen for the vast majority of the major Mine and Smelter installations throughout the world in the past few years. Word of their superior performance and advanced design has spread from one project to another prompting their continued selection.



ROBINS *Gyrex Screens*

with Super-Gyraloy Screen Cloth are transforming flow sheets in primary and short-head cone crushing plants. They give high-capacity service with exceedingly low power consumption; excellent screens for both scalping and accurate sizing.



ROBINS *Oro-Feeders*

represent the "latest" in heavy duty Feeders. They handle more and larger-sized ore, live longer and cost less for maintenance. The manganese steel feeder pans are integral with the chain and not bolted to it. All wearing parts may be renewed without dismantling the feeder.

ROBINS offers up-to-date designs in everything for handling and screening ore between the receiving bin and the grinding machinery. Robins Oro-Feeders, Belt Conveyors, Gyrex Screens, Belt and Roll Feeders, Belt and Bucket Elevators, Chutes and Gates; Mead-Morrison Car Dumpers for use at open pit mines and Robins Messiter Ore Bedding and Reclaiming Systems for smelters—and a complete Engineering Service.

Visit Our Booth No. 87 at the Denver Exposition

ROBINS CONVEYING BELT COMPANY

15 PARK ROW — NEW YORK, N. Y.

37 W. VAN BUREN ST. — CHICAGO, ILL.

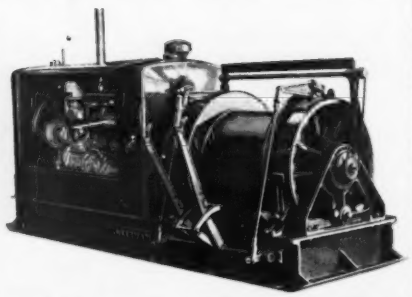
MATERIAL HANDLING ROBINS EQUIPMENT

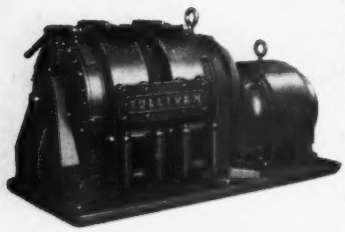
SULLIVAN

IS ESTABLISHED IN T

SULLIVAN HOISTS

SULLIVAN PORTABLE SHAFT HOISTS are made in capacities up to 150 H.P. Diesel driven types are "specially" designed for those "out-of-the-way" places where economical operation is required.

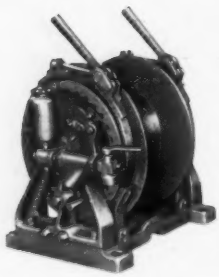




SULLIVAN TWO AND THREE DRUM SCRAPER MUCKING HOISTS are made in many types and sizes.—Can be powered with interchangeable air or electric drive for scraping in stope, drift or cross-cut or for mounting on loading slide. Ask for bulletin 76-Y.

SULLIVAN also makes CAR-PULLER HOISTS, SUPPLY HOISTS and SLOPE HOISTS.

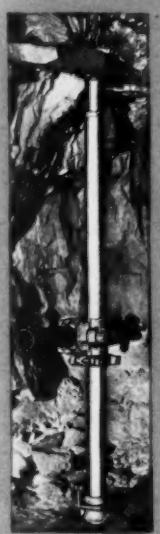
SULLIVAN MULTI-PURPOSE PORTABLE HOISTS with internal air or electric motors allow small powerful units designed to meet the requirements of all utility jobs. Ask for bulletin 76-X.



SULLIVAN PORTABLE HOISTS . . . lead in Performance and Economy. . . . Built with an intimate knowledge of metal mining problems, they offer you Savings in power and repairs whether you—SCRAPE—HAUL—LIFT OR LOAD.

A CHAIN is no stronger than its weakest link. Keep your chain of production strong by linking Sullivan equipment together to work for you. Sullivan machines are built to do many jobs and do them better—a

SULLIVAN ROCK DRILLS



U-156 HYDRAULIC COLUMN

T-11—3 in. DRIFTER

Since a chain is no stronger than its weakest link, and a drill is only as good as its parts, SULLIVAN, in realizing this, has designed its drills accordingly; and the accurate machining of parts from the best obtainable materials

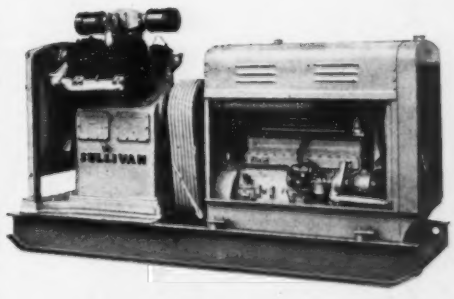
SULLIVAN MACHINERY COMPANY

LEADERSHIP

THE METAL MINING FIELD

AIR COMPRESSORS

fact proven by years of outstanding leadership under the toughest field conditions. Be sure to see the newest developments in Sullivan equipment at the Metal Mining Congress this year at Denver.



UNITAIRS — Two stage, air cooled units up to 400 C.F.M. (75 H.P.). Light, compact and dependable. Available for any kind of drive from any convenient power source.

Pictured is a Unitair "V" belt driven from gasoline power unit.

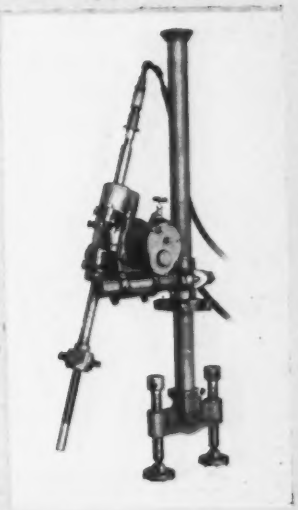
Larger compressors—famous Sullivan Angle Compounds—available for greater air requirements.

FOR DEPENDABILITY

assures you REAL PERFORMANCE enabling you to maintain that chain—the CHAIN OF PRODUCTION.

For increased output at lower cost use SULLIVAN ROCK DRILLS.

CORE DRILLS



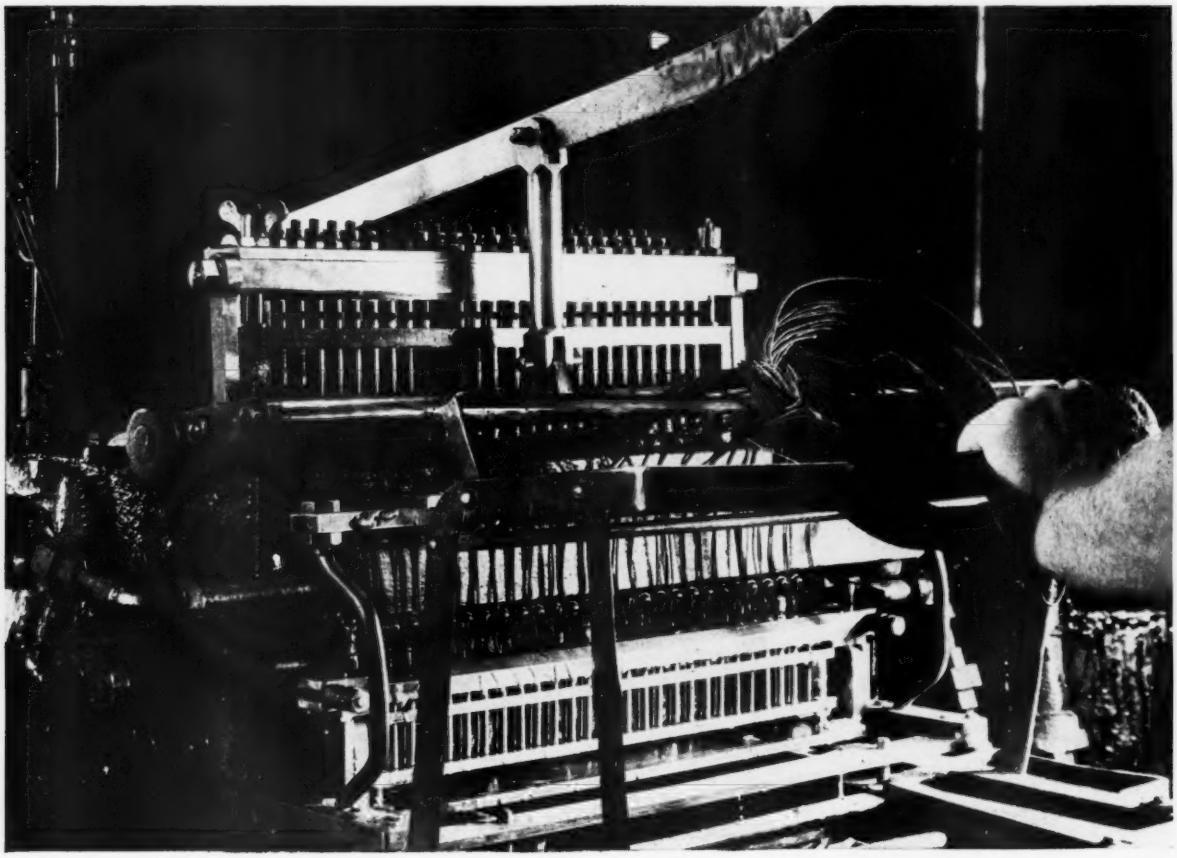
The core drill, pioneered by Sullivan, has made possible the proving of the world's mineral resources with a speed and economy otherwise impossible.

Sullivan leadership is no better exemplified than in the complete line of modern high speed core drills available for mineral prospecting.

Pictured is the No. 6, the smallest of the line and the standard underground drill the world over.

307 NORTH MICHIGAN AVENUE, CHICAGO, ILL.

MAKING BETTER BLASTING CAPS



PUTTING ON THE PRESSURE

One important reason for the superiority of Hercules electric firing devices is the effective waterproofing seal. By **pumping** waterproofing into the shells under pressure (an exclusive Hercules development), air bubbles and cavities are eliminated. Thus, this possible cause of misfires is prevented.

Another check against misfires is the basic design of the Hercules firing assembly. The snug-fitting, straight-sided plug resists any tendency of the waterproofing to seep through to the bridge wire. Construction details, such as these, help you to obtain satisfactory blasting results.

HERCULES POWDER COMPANY INCORPORATED 934 KING STREET, WILMINGTON, DELAWARE

Blasting Caps
Electric Blasting Caps
Delay Electric Igniters
"No Vent" Delays
Electric Squibs

Please send complete information on Hercules Explosives and Blasting Supplies.

Name _____

Address _____

City _____ State _____ J-12

9 AKINS CLASSIFIERS to CLIMAX Molybdenum Co. SINCE 1934--*All in operation*

Chosen After Exhaustive Tests

The installation and operation of nine AKINS CLASSIFIERS since 1934 at CLIMAX is just one example of recent and present trend to the AKINS method. The first AKINS purchased was a 78-in. Simplex High Weir type which was used in severe competitive tests. As a result of these tests seven 78-in. Duplex High Weir Classifiers were bought and placed in operation. More recently a 48-in. Duplex Submerged Spiral AKINS has been placed in the concentrate regrinding circuit.

Here Are a Few of the Many AKINS Users Thruout the World

ALDERMAC MINES, LTD., Aldermac, Que, Canada.
ANACONDA COPPER MINING CO., Anaconda, Montana.
BASE METALS MINING CORP., LTD., Field, B. C., Can.
CONSOLIDATED MINING & SMELTING CO. OF CAN., LTD., Chapman Camp, B. C., Canada.
CARNEGIE STEEL CO., Edgar Thompson Furn., Bess., Pa.
CERRO DE PASCO COPPER CORP., Peru.
CLIMAX MOLYBDENUM CO., Climax, Colorado.
COLORADO FUEL & IRON CORP., Minnequa, Colorado.
COMBINED METALS REDUCTION CO., Stockton, Utah.
CRIPPLE CREEK MILLING CO., Cripple Creek, Colorado.
CUBAN MINING CO., Cristo, Cuba.
EMPIRE ZINC CO., Hanover, N. M., and Gilman, Colo.
THE FRESNILLO CO., Fresnillo, Zac., Mexico.
GOLDEN CYCLE CORP., Colorado Springs, Colo.
HOLLINGER CONS. GOLD MINES, Timmins, Ont., Can.
HOWEY GOLD MINES, LTD., Toronto, Ontario, Canada.
LITTLE LONG LAC GOLD MINES, Geraldtown, Ont., Can.
PICKLE CROW GOLD MINES, LTD., Toronto, Ont., Can.
POTASH COMPANY OF AMERICA, Carlsbad, N. M.
RIO TINTO CO., LTD., Provincia De Huelva, Spain.
SUNSHINE MINING CO., Kellogg, Idaho.
UNITED EMPIRE GOLD MINES, Boulder, Colorado.
BOULDER MILL & DEVELOPMENT CO., Salina, Colo.
UNITED STATES SMG., REF. & MNG. CO., Midvale, Utah.
VINEGAR HILL ZINC CO., Cuba City, Wisconsin.
MOUNT ISA MINES, LTD., North Queensland, Australia.
WORCESTER TRIBUTORS PTY., LTD., South Africa.
ZINC CORPORATION, LTD., Broken Hill, N. S. W., Aus.

AMPLE sand raking capacity for *any* desired circulating load without auxiliary elevators. May be operated at slope as steep as 4 in. in 12 in. *without back slip.* Greater overflow capacity per foot width. Requires less floor space. Feed can be introduced *below* pulp level. No surge at any operating speed. Does not stall on overload. Starts after shut-down without unloading. Will produce extremely fine overflows. When desired, operates efficiently at high densities. Less power per ton thru circuit.

Mill operators are urged to investigate these claims of improved classification and trouble-free mechanical performance.

Send for this New Bulletin

OTHER CIW PRODUCTS

Skinner Multiple Hearth Roasters
Ore Crushers and Rolls
Lowden Driers - Diaphragm Pumps
Ball, Rod and Tube Mills
Smelting Equipment
Colorado Impact Screens

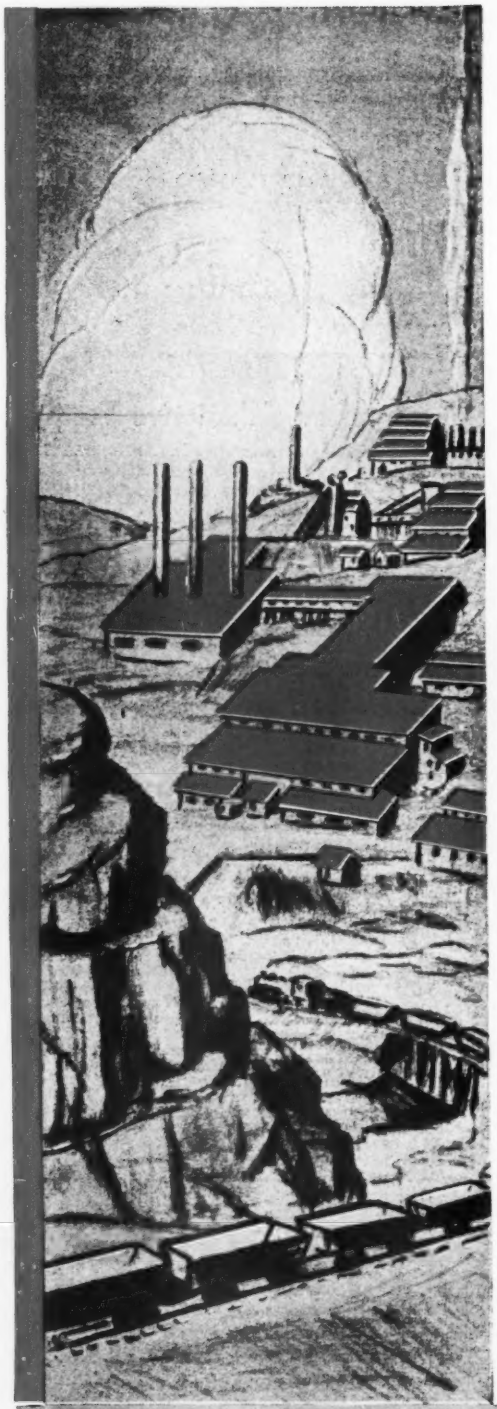
COLORADO IRON WORKS COMPANY

In Business 76 Years

Main Office and Works, DENVER, COLORADO, U. S. A.

- Head, Wrightson & Co., (South Africa) Ltd. Johannesburg
- Head, Wrightson & Co., Ltd., Stockton on Tees, England
- The Clyde Engineering Co., Ltd., Granville, N. S. W.
- Canadian Locomotive Co., Ltd., Kingston, Ontario, Canada
- Vancouver Iron Works, Ltd., Vancouver, B. C., Canada

COLORADO IRON WORKS CO.



Complete World-wide Service

STEP by step as the industry advanced, the service of Allis-Chalmers has grown and improved. At times functioning as definite leadership; at other times aiding in making the ideas of the mining industry's leaders commercially practical—always the service of Allis-Chalmers has been identified with progress in mining and metallurgical practice the world over. With its complete engineering and manufacturing organization, Allis-Chalmers is in unrivalled position to meet the industry's equipment needs.

Concentration, cyanidation, flotation machinery; ore crushing and fine grinding equipment including rod and ball mills; roasting, smelting, and converting equipment—hoists, pumps, compressors, blowers—these are but a part of the equipment which enables Allis-Chalmers to supply not only the complete mining and metallurgical plants but also the power and electrical equipment.

Building both the equipment and the necessary power units to drive it, Allis-Chalmers is enabled to assume the complete responsibility for the operation of its product. This assures perfect synchronizing as well as the advantages of combination pricing.

In view of Allis-Chalmers facilities, no order can, of course, be too large or complex for careful, efficient attention.

MINING DIVISION

ALLIS•CHALMERS

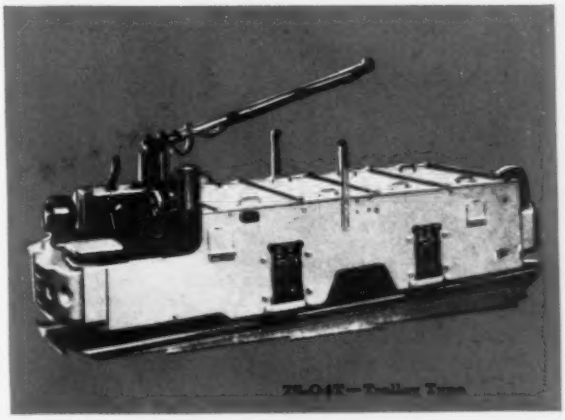
MILWAUKEE WISCONSIN

Dependable . . . THE WORD

MOST OFTEN USED BY METAL MINE OPERATORS

WHEN DISCUSSING GOODMAN LOCOMOTIVES

. . . and the reason so many of them are repeat buyers of Goodman Equipment

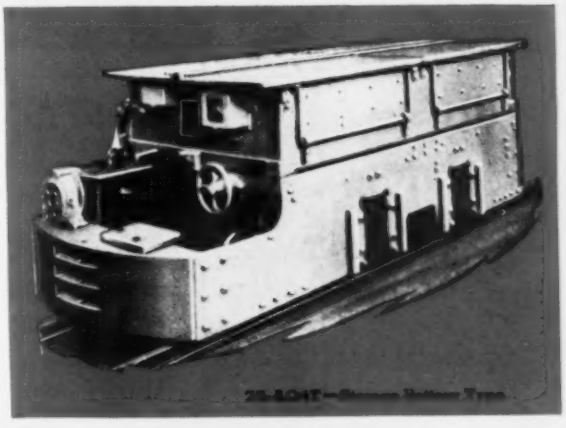


EVERY Goodman Locomotive is built to fulfill two definite requirements — suitability for the particular duties to which it is to be assigned; endurance and satisfactory performance.

Features specifically suited to metal mining service are incorporated in their design. They are built to meet narrow gauge conditions and limited clearances. All working units are amply protected from water, dust or muck. Storage Battery, Trolley or Combination Locomotives are available and they range from the lightest tramming to heaviest haulage types.

The qualities and characteristics in Goodman Locomotive design, which have been developed during our many years of experience in manufacturing underground equipment, are your assurance of dependability.

TWO POPULAR METAL MINING TYPES



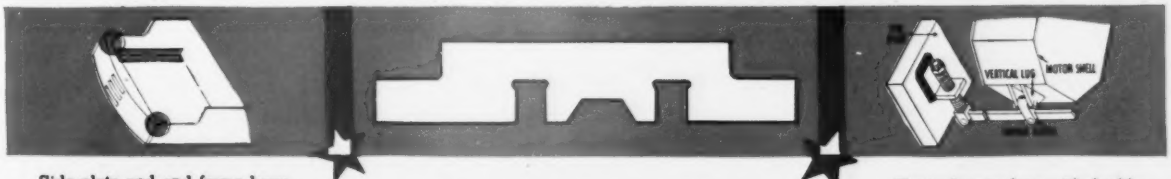
Significant Features of the Type 75 Locomotive

The frame construction, consisting of rolled steel side plates, rigid steel end frames and heavy floor plates, assures permanence of correct alignment for all working parts, minimizing the wear on axle boxes and tires and the liability of derailment. Rigidity is supplied by strong corner construction, as illustrated below. Battery type Locomotives can be lubricated from outside of frame.

The motors have a high continuous rating to protect against breakdown. Large slow-speed armatures drive the axles thru single reduction gearing. Each motor is encased in a solid shell cast integral with one half of heavy axle gear case (water, dust and oil tight) to prevent mechanical injury. The armature shaft is removable. The controls are of a type to conserve battery energy.

Goodman Transverse Equalizers reduce strains resulting from irregular track, permit fewer derailments and equalize weight on all four wheels, insuring maximum drawbar pull.

Ask for Circular H-320-B.



★ Side plate and end frame have accurate shoulder fit, which, together with gusseting effect of floor plate, assures rigidity. ★

★ Cut-outs in frame afford access to brake adjustments and facilitate rerailing. ★

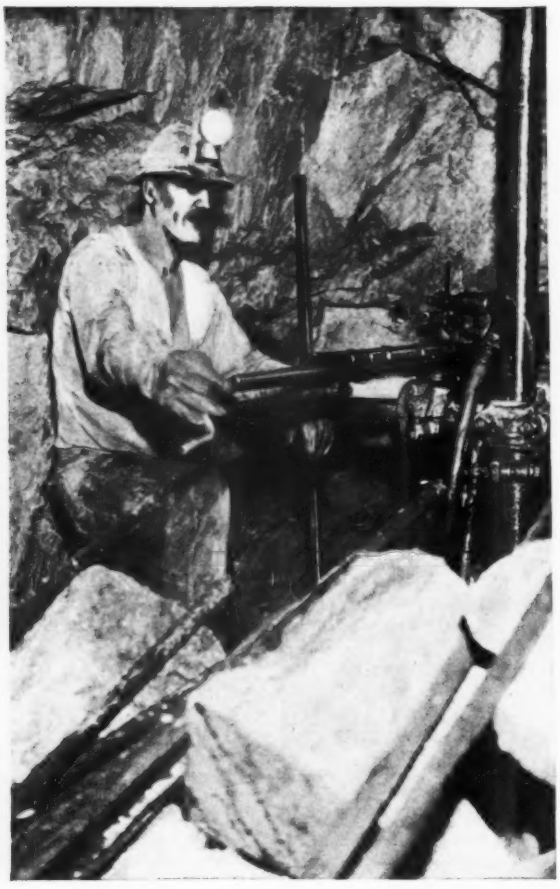
★ Vertical motor lugs with double clevis construction, provide flexibility of universal joint to motor supports. ★

GOODMAN

MANUFACTURING COMPANY · 4834 S. HALSTED ST. CHICAGO, ILL.

LOCOMOTIVES · LOADERS · COAL CUTTERS

PITTSBURGH • WILKES-BARRE • HUNTINGTON, W. VA. • BIRMINGHAM • ST. LOUIS • DENVER • LOS ANGELES



There Is More to Shooting These Days

Modern metal mining is exacting in its demands on explosives. The advance of mechanization and the progress of efficient methods makes exactly the right explosive for the job more of a profit factor than ever before.

In the metal mining industry, the enormous variation in conditions intensifies the special aspects of each blasting problem and emphasizes the need for selection of the proper explosive to give exactly the right blasting action.

The list of Atlas Explosives fitted to metal mining ranges from Permissibles to High Strength Gelatins. Some operations require good fume gelatins; while others may call for black powder types.

Whatever the problem, Atlas offers the right explosive for the job. Consult the Atlas representative—his specialized knowledge and experience are at your service.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

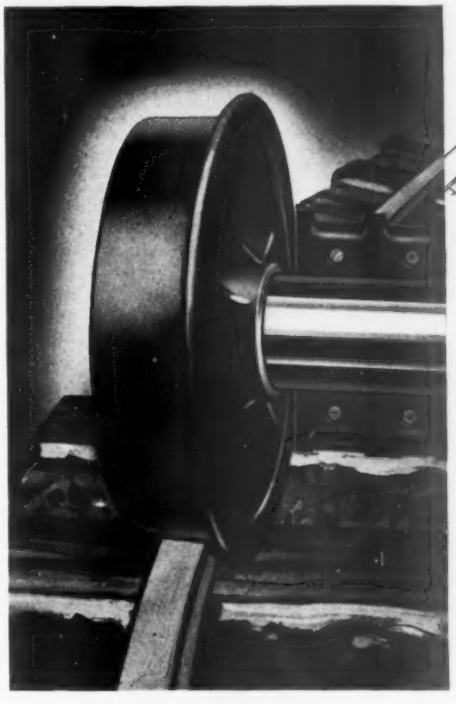
Allentown, Pa.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Kansas City, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Denver, Colo.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.
Houghton, Mich.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

THRUST . . .



. . a Big Threat to Mine Car Bearing Life

No matter how efficient a mine car bearing may be in other respects, if it cannot control THRUST it will not give you maximum service.

THRUST is the severe sidewise stress placed upon the bearings when mine cars hurtle around curves— and it is as deadly as a rapier stab.

Timken Mine Car Bearings are constantly "on guard" against thrust. Their tapered rolls and raceways of Timken Alloy Steel turn back every attack with sureness and ease.

When bearings have little or no inherent thrust resistance, auxiliary devices must be used. These commonly consist of thrust plates or washers. Such make-shifts, however, are subject to rapid wear and, furthermore, they greatly impair the easy rolling qualities of the bearings under thrust loads.

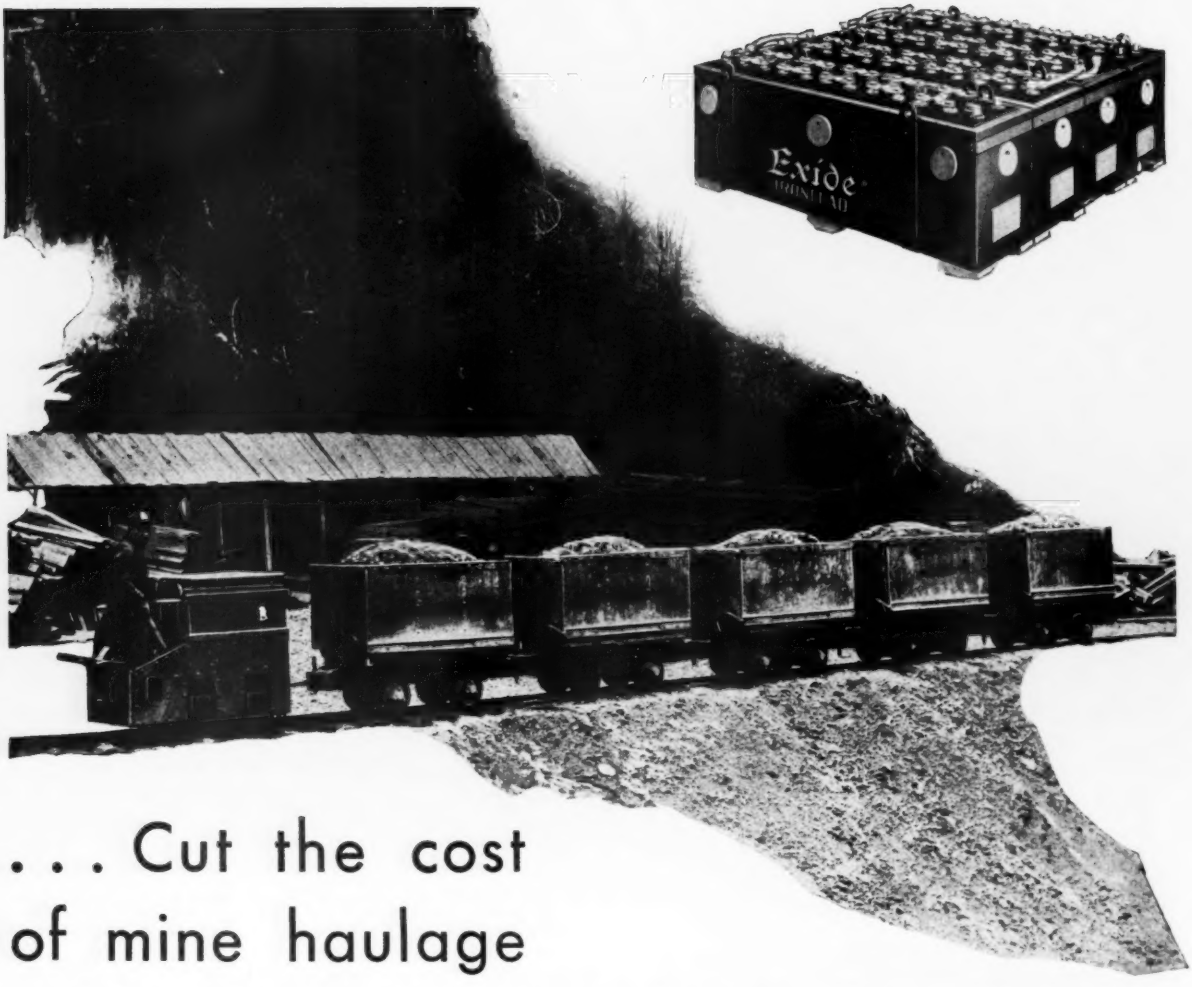
There is no substitute for Timken thrust capacity in mine car bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Tapered Roller
TIMKEN BEARING
EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

TIMKEN TAPERED ROLLER BEARINGS



. . . Cut the cost of mine haulage with EXIDE-IRONCLAD BATTERIES

You'll save money operating trammers or locomotives with Exide-Ironclads. These batteries keep maintenance costs down. They are trouble-free, and economical at the charging panel. You can depend on Exide-Ironclads to give you long and excellent service at low cost.

Equally important is the performance of Exide-Ironclads. Their high power ability keeps heavy loads moving at good speeds. Their sustained voltage keeps them on the job throughout an entire shift, and prevents interruptions in your hauling service. The result is more work done in less time, and at lower cost to the operator.

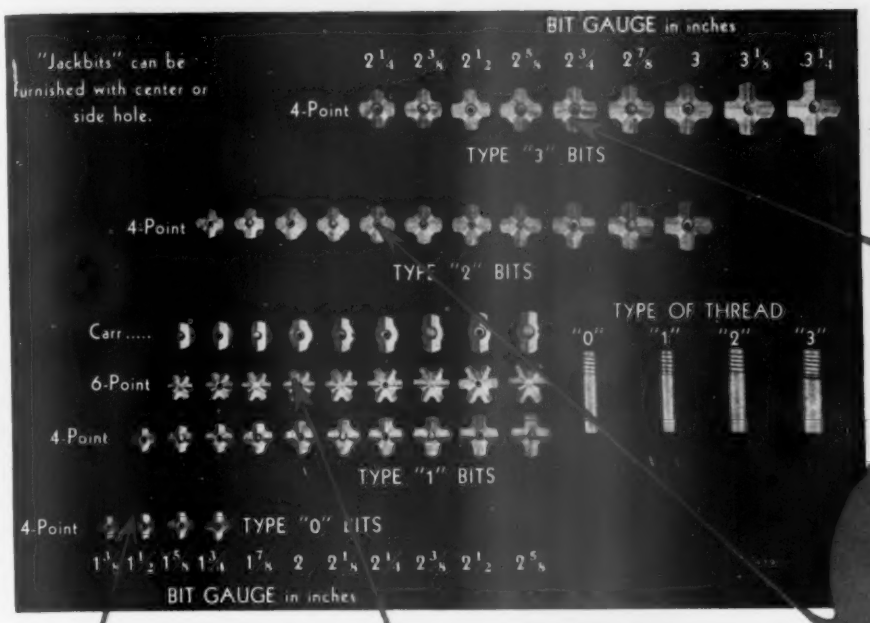
The unique construction of Exide-Ironclads is one reason for their economical performance. The slotted rubber tubes of the positive plates retain the active material while exposing it freely to the electrolyte. At no extra cost, Exide-Ironclads are equipped with the new Exide Mipor Separator—the permanent storage battery plate insulator that is immune to electrolyte, heat and vibration.

Let Exide-Ironclads improve your hauling service and cut costs. Write for new booklet, "Storage Batteries for Underground Haulage."

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES
WITH EXIDE MIPOR SEPARATORS
"MIPOR," Reg. U. S. Pat. Off.

"JACKBITS" FOR ALL CONDITIONS



TYPE 3

For use with Wagon Drills in hard ground and where large holes are necessary.

TYPE 2

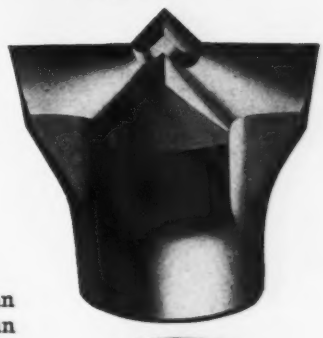
For heavy Sinkers, medium and heavy Drifters in hard ground; for Wagon Drills in medium hard ground.

TYPE 1

For Jackhamers, light Drifters, or automatically-rotated Stopehamers in soft or medium hard rock.

TYPE 0

For use with light Jackhamers in coal or soft rock.



A complete range of more than 100 standard sizes and types of Jackbits enables you to obtain the correct bit for your job.

An Ingersoll-Rand compressed-air or electric-driven Jackbit grinder is available for resharpening Jackbits, most sizes of which can be reground one to three times.

The Jackbit patented thread is simple, strong, long-lived and easy to make. Jackrods can be threaded with a hand threading tool; or in a power-operated threading machine; or in a lathe; or in an Ingersoll-Rand sharpener.

An experienced I-R rock drill man will gladly assist you in organizing an efficient method of handling Jackbits and Jackrods. A large I-R dealer organization is equipped to serve you and to help you with your regrinding, rethreading and reshanking if you do not use enough bits to warrant putting in your own equipment for such work.

If you are not already using Jackbits, we believe we can help reduce your costs and increase your output. Telephone our nearest office.

Birmingham
Boston
Buffalo
Butte
Chicago
Cleveland
Dallas
Denver
Detroit
Duluth
El Paso
Houston
Knoxville
Los Angeles
Newark
New York
Philadelphia
Pittsburgh
Salt Lake City
San Francisco
Scranton
Seattle
St. Louis
Tulsa
Washington
Pitcher

Ingersoll-Rand

11 BROADWAY, NEW YORK CITY

289 S

MODERN EQUIPMENT MODERN METHODS

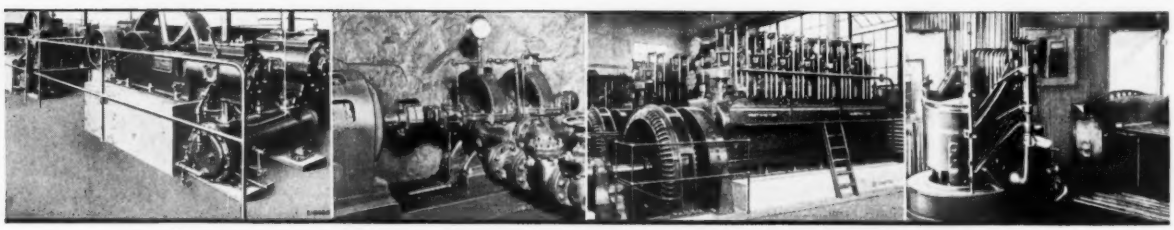
. . . PRIME REQUISITES FOR PROFITABLE MINING . . . especially today

WORTHINGTON has contributed extensively to the art of rock drilling for mines and tunnels . . . by the introduction of modern rock drills, strongly built, high in drilling speed, economical of air.

- The Worthington Pneumatic-Feed Drifter cuts down idle drilling time.
- The new Worthington Hole Spotter collars the drill hole instantly. The helper runs no risk of injury to his hands. A *Safety First* device.
- On the Metropolitan Water District of Southern California, a large part of the tunnels are being driven with these Worthington Pneumatic Feed Drifters.

Other Worthington products for mines:

AIR COMPRESSORS	DIESEL ENGINES	ROCK HAMMERS
V-BELT DRIVES	GAS ENGINES	SCREW-FEED DRIFTERS
PUMPS	DRILL SHOP EQUIPMENT	DRILL ACCESSORIES



WORTHINGTON PUMP AND MACHINERY CORPORATION

General Offices: **HARRISON, NEW JERSEY** • *Branch Offices or Representatives in Principal Cities throughout the World*

A-357

WORTHINGTON

ATLANTA BOSTON BUFFALO CHICAGO CINCINNATI CLEVELAND DALLAS DENVER DETROIT EL PASO HOUSTON KANSAS CITY LOS ANGELES NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS ST. PAUL SAN FRANCISCO SEATTLE TULSA WASHINGTON

Tariff Not a Political Issue

INCREASED importation of foreign goods and decreased exports of American goods seem to justify a further discussion of the merits and demerits of the protective tariff theory.

To the extent that the domestic market is absorbing the increased importations, to that extent are we preventing the employment of those needing work.

The tariff is an industrial and not a political issue. Wages in the United States represent approximately 95 per cent of the market price of merchandise. This includes not only the wages paid by the manufacturer for production but also the wages of those who built the plant; who produced the raw materials used; who built the railroad which transported the raw material to the manufacturer and the finished product to the consumer.

Wage levels then are the all important factor in price levels.

In a self-contained Nation it matters not how high the price levels and wage levels are where all are employed.

To the extent however that we desire to sell surplus goods in foreign markets the question is all important. And to the extent that we hope to control our own markets without an adequate protective tariff, the question is all important.

The great purpose of tariff restrictions is to preserve such competition as will effectually protect the rights of consumers, not only those who consume but also, and particularly, those who produce and consume.

Approximately 90 per cent of our total production is consumed at home. Our domestic market must be relied upon to keep the wheels of industry moving eleven months of each working year while our exports should provide employment for one month.

This does not limit our imports to a volume equal to our exports but it does limit imports of competitive goods which necessarily displace domestic labor.

The earning power of the American workman during prosperous years is far in excess of his necessities. This because of higher skill, mass production and increased use of machinery. With these increased earnings he is able to pay for and use largely increased importations which in turn will enable debtor nations to gradually pay the loans made to them in time of stress.

The world can be stabilized without repudiation—world prosperity and peace must ever depend upon the integrity of nations. No complete confidence between individuals or nations can exist where either suspects the integrity of the other.

No problem is of greater importance than world peace.

Peace between nations can only be permanent where each respects the rights of others; where each recognizes the right of other nations to control their own internal affairs.

When France in order to stimulate the production of wheat within her own borders justified the reward of a high price by practically prohibiting wheat importations she acted strictly within her rights and no foreign wheat producer had any right to complain.

When our own country limits imports by a tariff duty which measures the difference betweeen the labor cost of the specific article at home and abroad she is strictly within her rights and no foreign country has any just reason to complain.

Notwithstanding the foolish position taken by some public men, that any import restriction tends to destroy world amity, it is a fact that every nation will insist on the right to control its own internal affairs and, if consistent, will recognize the same control by its sister nations.

To every nation must be conceded the right to limit or prohibit importations, either of labor or the products of labor, in order that the opportunity of its citizens to earn a living may not be abridged.

World peace cannot be made secure when the citizens of any country believe they are being imposed upon by any foreign nation. Internal prosperity cannot be maintained except by a complete respect for the same fundamental principles.

The tariff is an industrial not a political problem.

The Mining Congress Journal

Volume 22 SEPTEMBER, 1936 Number 9

E. R. COOMBES, Editor

A Journal for the entire mining industry published by The American Mining Congress

A Worthy Heritage

WE ARE a nation of pioneers, heirs to a vast heritage of courage, persistence and a record of accomplishment. Our forefathers paved the way for the truly magnificent advancement of the past 50 years. The huge mineral development of the United States, greater and more varied than that of any other nation, is due to one thing—courage. The courage of those pioneers, who not only saw properties with opportunity for immediate operation, but also saw in combination of properties and capital opportunity for vast economies of operation; pioneers whose vision encompassed the great basic industries that are the very foundation of our civilization. The development of the mining industry has been the backbone of our industrial progress. The men who have been responsible for its development have been men of courage, men who can accept defeat and success with equal grace and carry on in spite of tremendous odds.

During the last few years the industry has needed courage. Abrupt economic changes, legislative restrictions without point or value, abnormally high interest rates and taxation, have presented perplexing problems. No one doubts that the industry will meet its problems with a real faith in the future, but most certainly an industry that furnishes a livelihood for some 25,000,000 persons should command the most thoughtful consideration of the nation.

The Value of Conventions

ONCE EACH year the American Mining Congress brings together metal mining men for a discussion of, and remedial suggestions for, the solution of their mutual problems. These conventions have demonstrated their value, the result being intelligent recommendations and action in behalf of the industry as a whole. That concerted action on the part of all branches of the mining industry has become absolutely essential to the welfare of the industry cannot be questioned.

Hundreds of mining men will be in attendance at the annual convention of the Western Division of the Mining Congress at Denver, September 28 to October 3. Thus, they will perform a service for the mining industry by inviting and justifying public confidence and support in the solution of their most vital problems. The resolutions adopted will present the means of united and cooperative action to the end that much of the uncertainty and unrest that now obstructs prosperity may be eliminated.

Officeholders

ONE JOB in each ten is a Government job, according to the annual report of the National Civil Service Reform League. It is a startling fact that the Government now employs 824,259 persons, with an annual wage bill of $129,847,167. This figure approaches the World War record. Six thousand four hundred and three employes were added in June of this year. This number does not include 24,178 employes hired "under special letters of authorization," with an additional payroll of $1,173,469.

Recently a leading Democratic daily in discussing this situation said: "Except for a handful of policy determining places at the top, and a few hundred truly confidential positions down the scale, every one of those government posts, Federal, state and city, should be removed from political control. How otherwise prevent the officeholders from exercising an undue influence over elections? * * * In a recent national newspaper poll 88 percent urged that jobs be given to those qualifying in Civil Service examinations."

We have repeatedly urged a curtailment in growth of government, and a strict adherence to the Civil Service record established after years of effort. Those who pay taxes for the upkeep of government have the right to demand that efficiency control.

One Third of the National Payroll

THE National Association of Manufacturers recently completed a survey of 694 companies, representing 25 leading industries, to ascertain the proportion of taxes paid, in relation to payroll, sales and dividends. The results indicate a situation that is far from reassuring. They report that for every dollar industry spends on payrolls it must spend 34 cents in taxes, and that for each dollar paid in dividends last year, the tax load was $1.42. Taxes in the 25 industries amounted to an average of $486 per employe.

With a national debt of billions, with Government expenditures increasing in magnitude, industry is justified in its concept. The effort to pull industry out of the depression, to establish higher wage scales and increased prosperity certainly will not be assisted by penalizing the group that is the major factor in recovery. It is well for those who lead to recognize the fundamental truth that industry does not exist for the sole benefit of the tax collector and the wage earner.

The Future of GOLD Mining†

By FRANCIS A. THOMSON*

THAT there is plenty of room for honest difference of opinion in regard to the action of the United States in "going off gold" is evidenced by the fervor and obvious sincerity with which Herbert Hoover in his 1932 campaign recited the herculean effort he had made to keep the United States from deserting the gold standard.

In a sense, Mr. Hoover was right, for as Mr. Snowden said in his address to the British Parliament, as Chancellor of the Exchequer on September 21, 1931, "The crisis which we have striven to prevent broke in our face and there was no alternative but to suspend the gold standard." Or as Stephen Leacock put it, "Great Britain did not decide to go off the gold standard. A man sliding down the roof of a barn does not decide to fall off."

But this is neither the time nor the place to discuss a matter so debatable as adherence to the gold standard except to indicate that the gold miners' interest in the subject is only one phase of the question. Nevertheless, in 1931 and 1932 the gold miners of the United States were being penalized by our remaining on the gold standard while in the British Dominions a premium, which finally reached as much as 30 to 40 shillings an ounce, was being paid for gold above the normal or legal rate of £4/4/.11½ ($20.67 at standard exchange). Now, it would be absurd to say that the various steps taken in 1933, first by the President in placing an embargo on gold shipments, and ultimately by Congress in giving the President authority to reduce the gold content of the dollar as much as 50 percent, were designed primarily for the benefit of the gold miner. Notwithstanding this, the gold producer has benefited, although perhaps less than he thinks, by the increase in the price of gold to $35 an ounce.

In any event, those of us who have spent a lifetime in the mineral industry had come to regard the price of gold as such a reference point or "bench-mark" (as the surveyor would say) that it has taken us a little while to orient ourselves to the new situation. To see gold quoted in the newspaper every day, like copper, cotton, or cattle, is something which neither we nor our fathers or grandfathers had ever experienced. Contrary to general impression, however, gold throughout the ages has undergone many changes in price. For example, in 1344 gold was quoted in London at 22 shillings an ounce, or a little better than $5 in terms of present-day exchange (although this does not mean anything). Between 1344 and 1717 the price of gold increased, not gradually but spasmodically, to £4/14/.11½, which remained the price in sterling from 1717 to 1919, when Great Britain first went off gold. But those of us who live in the present have so little sense of history that a thing which has remained fixed for 202 years might almost as well have been fixed at the time of the Pharaohs. Speaking of the Pharaohs, what was the price of gold then? Nobody seems to know, and if they did, what would it mean? Who can convert into terms of money the 20 talents of gold which Assur-Uballit. King of Assyria, requested Amenhotep IV to send him? What we do know is that about 2,000 B. C. copper and gold were of about equal value. Furthermore, we know that in the thirteenth or fifteenth century B. C. (in the time of King Tut-ankh-Amen) gold was worth about 13 times as much as silver, and that with occasional fluctuations, approximately this ratio between gold and silver continued for about 2,600 years, which brings us to 1344 A. D., when, as stated, we have gold quoted at 22 shillings an ounce in England.

Why all this history, you ask, and what has it to do with gold mining in the United States today? Simply this, that a careful search of the history of the price of gold shows a record not of steady increase of price, indeed, but of intermittent, spasmodic price increases without a single significant recession.

Prophecy is dangerous, but unless "history is bunk," as Henry Ford once

TABLE I.—DISTRIBUTION OF GOLD PRODUCTION CONTROL IN 1935

	Ounces	Value at $35 oz.	Pct. of total
I. United States	3,116,000	$109,060,000	9.9
II. British group:			
Transvaal	10,750,000	376,250,000	34.1
Canada	3,260,000	114,100,000	10.3
Australia	866,000	30,310,000	2.7
Rhodesia	710,000	24,850,000	2.2
West Africa	400,000	14,000,000	1.3
British India	326,000	11,410,000	1.0
New Guinea	255,000	8,925,000	0.8
New Zealand	160,000	5,600,000	0.5
Newfoundland, Tasmania and Fiji	19,000	665,000	0.1
Total British	16,746,000	$586,110,000	53.0
III. Russia and Siberia	6,240,000	218,400,000	19.7
IV. South America	1,320,000	46,200,000	4.2
Japan and Chosen	871,000	30,485,000	2.8
Congo, Egypt, etc	830,000	29,050,000	2.6
Mexico	774,000	27,090,000	2.4
Europe (ex. Russia)	770,000	26,950,000	2.4
Philippines	431,000	15,085,000	1.4
All others *	502,000	— 17,570,000	1.6
Total Group IV	5,498,000	$192,430,000	17.4
World totals	31,600,000	$1,106,000,000	

* Includes Central America, East Indies, China and Papua.

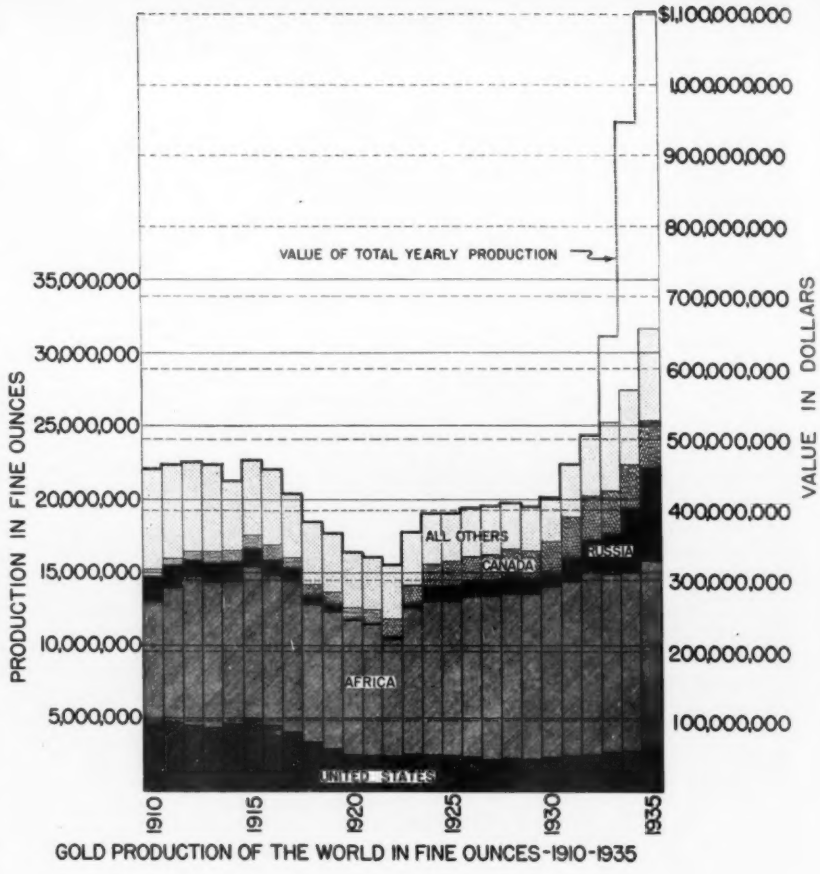
* President, Montana School of Mines.
† An address delivered at the State Mining Association of Montana, Butte, Mont., July 17, 1936.

said and has since, I suppose, regretted, this probably means that gold will never go back to the old $20.67 price. In addition, and vastly more significant, the British Dominions, Russia, and the United States are the only substantial gold producers, and between them these three nations control 83 percent of world gold production. (Table I.)

The English-speaking group has revalued its currencies—that is, they have reduced the amount of gold in the pound sterling and the dollar—thus increasing the value of gold in terms of money and decreasing the value of money in terms of gold. Russia, on the other hand, finds the increased price of gold to her advantage in trading her rapidly mounting gold production for commodities in the world markets. Hence, it is clearly not to the advantage of England, Russia, or the United States to allow the price of gold to slip back again. France, drastically depreciated her currency before the depression and naturally does not want to do so again; therefore she clings to the old gold standard. But France controls practically no gold production, and world pressure will soon be too strong for her.

In a measurably short time there must surely be a world monetary conference, the main business of which will be the stabilization of exchange on an agreed gold price. Will the price be above or below $35? That is the paramount question for the gold miner. So far as the United States is concerned, the President has legal authority to reduce the gold content of the dollar 50 percent—that is, to make the price twice $20.67, or $41.34—thus, so far as present legislation goes, this is the United States maximum. There is a charm in simple arithmetic, and for this reason the international dignitaries might adopt $41.34. On the other hand, the pound sterling and the American dollar have reached a near equilibrium with $35 gold, and if this continues up to the time of the conference, $35 might easily become the pegged price. Nobody would want to lower it, except France. And unless France by that time, as will probably be the case, has bowed to the inevitable, she would protest, but would find few supporters. Thus it seems reasonable that on the basis first of history and, more important, of world economic interest, the price of gold will soon be fixed, and fixed for a considerable period, provided there is no world war, at a price somewhere between $35 as a minimum and $41.34 as a maximum.

Are we therefore justified in concluding that the future of gold mining is to be like the rosy dawn of a new day? I wish devoutly that we were. But the purpose—the main purpose—of the present administration in devaluing the dollar was two-fold. First, to increase prices at home, and second, to meet foreign prices in the export market. Had the purpose of increasing prices at home become immediately effective and in inverse proportion to the decrease in the amount of gold in the dollar, then the gold miner's supplies, his power, and his labor would have increased in direct proportion to the increase in the price of his gold and the gold miner's advantage would have been wholly illusory. Such, however, has not been the case; prices have increased, the cost of labor has increased, but as a whole the gold miner is still in position to reap perhaps 50 percent of the apparent $14.33 increase in the price of his product.



GOLD PRODUCTION OF THE WORLD IN FINE OUNCES-1910-1935

Even this, of course, is true only of well-established gold mines which were on a sound basis of operation under the old gold price. New properties opened under the stimulus of the new price, or properties which were marginal or submarginal before the price increase, can operate only because of revaluation and must close immediately if gold goes back to the old price, or suffers any serious recession.

If, however, I am correct in my assertion that gold will shortly be "pegged" at something like its present price, then what of the future of gold mining in the Western States and elsewhere? The present impetus which is being given to the search for new deposits, to the reopening of old properties and to the bringing in of properties which were marginal under the old price, or which were abandoned because of increasing costs of production will continue, subject to certain reservations.

These reservations are:

1. *That the tendency for prices to creep up toward equality with the enhanced price of gold is checked.*

2. *That the Government does not kill the goose that lays the literal golden egg by excessive taxation.*

With regard to the first, it may well be that the spasmodic increases which history shows in the price of gold are explainable, to some extent at least, by the fact that for a time after a price increase had occurred gold production would be stimulated, but that as the time-lag in the price increase is gradually extinguished the search for and production of gold would be thereby gradually discouraged until another jump occurred in the price, and the cycle would begin all over again. This picture would be to some extent blurred by bonanza discoveries, such as the placers of California, of Australia, and of the Klondyke, but such a hypothesis seems reasonable and it fits fairly well the events of the past 25 years during which no sensational new gold discoveries have been made.

With regard to the second reservation—the effect of increased and increasing taxation—it would be well for governmental tax experts to remind themselves that gold mining is perhaps of all industries the most sensitive to taxation, because with a product whose

price is fixed there is no way that the tax, or any part of it, can be passed on to the consumer.

The law of diminishing returns will operate with astonishing rapidity if gold mining is heavily taxed for the former marginal and sub-marginal producers will immediately give up the ghost and the tax return will be nil from this class of properties.

Canada and South Africa are already engaged in the perpetration of this economic blunder. A recent visitor from South Africa reports that in 1935 the Rand mines had a net production of $170,000, of which $85,000, or exactly 50 percent, was consumed by taxes of one sort and another.

An excellent example of some of the various effects of revaluation on gold mining in America is afforded by operations of the Alaska-Juneau Gold Mining Company in the years 1932-33-34 and '35. These figures are drawn from the annual report of the company, which are models of completeness and lucidity. (Table II.)

Several results are at once noted, all of which are typical and characteristic of the situation.

(1) The drop in tonnage in 1935 due to labor difficulties is probably not wholly unrelated to the increase in gold price and consequently in living cost.

(2) The gold yield in dollars per ton has increased 43 percent from 1932 to 1935, but the actual gold content of the ore has declined 14.7 percent. The increase in the price of gold has permitted ore of lesser gold content to be worked. As a necessary corollary, ore reserves must obviously have increased considerably.

(3) Mining costs have increased in four years by 33 percent; part of this is no doubt chargeable to additional depth at which work is being done and to additional development, but by no means all of it.

(4) Milling costs have remained about constant. I think this accords with general experience. Labor and supplies constitute a much smaller proportion of cost than in mining.

(5) "Other costs" have nearly doubled, in part due, no doubt, to labor troubles. This also is the common experience, and in the case of Alaska-Juneau this figure is exclusive of Federal tax and depreciation.

(6) The net result of all these factors has been first a marked increase in excess of yield per ton over cost for '33 and '34 as compared with '32, followed by a decrease in 1935 as compared with 1934. Whether this tendency will continue remains to be seen. I suspect it will in all established gold properties where the grade of ore has not changed markedly.

(7) The same tendency is shown in the cost of gold per ounce and correspondingly in the net per ounce. It is interesting to note that $6.93 of the $14.33 increase, or only 48.4 percent, remains with the mine.

TABLE II.—ALASKA-JUNEAU GOLD MINING CO.

	1932	1933	1934	1935
Price of Gold	$20.67	$25.35 [1]	$35.00	$35.00
Tons Mined	4,001,630	4,085,960	4,302,600	3,729,660
Gold Content—per ton mined [2]	0.0484 oz.	0.0474 oz.	0.0402 oz.	0.0413 oz.
Total Yield—per ton [3]	$0.8087	$0.9693	$1.0651	$1.1478
*Gold Yield—per ton	0.0378 oz.	.0369 oz.	0.0298 oz.	0.0319 oz.
*Gold Yield—per ton	$0.7813	$0.9354	$1.0430	$1.1169
Costs—per ton:				
Mining	$0.2624	$0.2603	$0.3056	$0.3496
Milling [4]	0.2120	0.2014	0.1932	0.2160
Other	0.0641	0.0732	0.0659	0.1128
Total	$0.5385	$0.5349	$0.5647	$0.6784
Net Per Ton—All metals, excl. tax and dep.	$0.2702	$0.4344	$0.5004	$0.4694
*Net Per Ton—Gold only, excl. tax and dep.	$0.2428	$0.4005	$0.4783	$0.4385
*Cost per oz. of gold, incl. tax and dept., with credit for Ag. and Pb. [5]	$15.29	$15.92	$20.39	$22.69
*Net per oz. of gold	$5.38	$9.43	$14.61	$12.31

[1] Total gold value divided by total fine ounces.
[2] Ore is sorted in the 4 years given 58 percent is milled, 42 percent is rejected.
[3] Lead and silver recovery 2 to 3 cents per ton milled.
[4] Milling cost is distributed over total tonnage mined.
[5] No portion of cost is charged to the minute amounts of lead and silver.
* Calculated. All other figures are from annual reports.

As a whole, this presents, for mines already well established before the price increase, a distinctly typical picture—incomplete as yet, of course, but I think all the tendencies can be discerned, and discerned the more clearly because of extraordinary low grade and low costs.

Lower grade ore can be mined, but at an increased cost. The cost per ounce of gold—the only real measure of the success of any gold enterprise—has risen 48.4 percent, but a good margin is still left on $35 gold. Gradually, through rising costs and rising taxes, this margin will be diminished. If in the case of the Alaska-Juneau, the cost per ounce increases 100 percent above the 1932 cost, then the profit per ounce will be slightly less than in 1932, and in depreciated dollars at that.

Is this the handwriting on the wall and, if so, what is the interpretation thereof? Is it not that it behooves the gold miners to make hay while the sun shines? The price of gold will probably not be increased very much more in our lifetime. On the other hand, unless all signs and portents fail, costs will increase gradually and in time the margin will get narrower.

A glance at the gold production of the last 25 years is instructive (see table). Prior to 1929, mounting costs with a fixed gold price had discouraged production. As is always the case in time of depression, however, prices dropped, labor was more efficient, and gold production was somewhat stimulated before the price increase. Then came the premium on gold in the British Dominions, and they began to increase their gold production markedly. Gradually Russia is getting on her feet, and her gold production is increasing by leaps and bounds. Indeed, Russian sources predict $600,000,000 as the gold output for 1936. As is usual with Russian predictions, this is obviously a gross overstatement, but we have learned not to scoff too loudly at what "Russky" says he is going to do.

Finally, in 1935 the world's gold production for the first time in history has exceeded a billion dollars in value, and there is every prospect that in the next few years it will exceed even this total.

For Montana, substantially the same thing is true. The value of the 1935 production is the greatest in the history of the state since 1887. In 1866 Montana produced $18,000,000 in gold—a figure hardly likely to be reached unless gold rises far beyond its present price. In every county in western Montana the gold fever is epidemic, and the infection is spreading to other parts of the state. Every gravel bed is being tested, and almost every old quartz mine is being worked.

One of the outstanding features of the picture, not only in Montana but throughout the world, is the fact that so few new mines or new districts have been found. Does this mean that all the gold mines in Montana and elsewhere have been discovered? Did the old prospector and his jackass find all that was to be found by surface prospecting? It is inconceivable. Part of the trouble is, I think, that we have all become soft and we want to do our prospecting with an automobile.

If one-one thousandth of the money that the relief organizations have spent on automobiles, gasoline, and tires alone could have been spent for burros, beans, and bacon, and if we could have trained a few thousand young men to hike in the hills and not to be afraid of getting out of sight of an electric light, I think we might have found a few new mines by this time. Success is attending an effort of this kind in Canada.

On the other hand, not all the gold lodes crop out at the surface. The Jay Gould vein west of Helena has been stoped for 2,800 ft. along its length, yet it crops out at one spot only, and for a short distance. Whether such a vein crops out at all or not is a mere accident of erosion. We need more and better geophysical prospecting or an X-ray machine that can look into a mountain.

But the situation is not all the fault of the prospector or of his disappearance. We need more of the venturesome spirit of the old time mining men who didn't know nearly as much about ore deposits

(*Concluded on page 76*)

—Horydczak.

Court Yard in Circular Plaza of Post Office Department, Washington, D. C.

Wheels of Government

IT is only natural that intense interest is felt in Washington over the primary campaigns and the results therefrom to Representatives and Senators in the National Congress who have occupied pivotal places in the legislative scheme in recent years. The defeat of Senator Gore in Oklahoma may be viewed as a serious loss to the mining and other natural resource industries. His brilliant replies to misguided and misinformed attacks on the proper deductions for the natural resources industries under the revenue laws constitute a precedent and a record which will be of value to the mining industries for many years to come.

Unless a Representative in Congress or a Senator has come directly from active participation in mining enterprise, it requires months and years of study and training for him to absorb a sufficient knowledge of the problems involved to see that equitable treatment is accorded in the maelstrom of legislative enactment. The natural resource industries will miss Senator Gore and it is to be hoped that his probable successor, now Representative Josh Lee, of Oklahoma, will be able to devote the time and study to the subject which will enable him to walk in the path of a great champion of fairness and equity.

Another interesting primary contest in the State of Mississippi has resulted in the renomination of Senator Pat Harrison, chairman of the Finance Committee of the Senate. In the course of the past month, the Senator made a dash by airplane from his home state to a White House conference on Federal taxation. The conference was credited to a letter addressed by the Secretary of the Treasury to the President, calling attention to the marked increase in revenues, due to improved activity in trade and business. As a result of the conference a three-point announcement was made as follows:

1. Assurance that no request would be made of the next Congress for levying of new taxes or increases in the present tax scale.

2. Statement by the treasury that present revenue yields, based on continued recovery would assure not the covering of Government costs of operation and a surplus for reduction of the debt. Taken at face value, this was the most definite assurance yet made toward the objective of a balanced budget.

3. Pushing of an immediate survey (spoken of before vaguely) by Congressional experts of existing revenue laws to determine which are inequitable taxes, particularly those unfair to consumers or to the trade, with the purpose of eliminating these.

There can be real accomplishment if a revenue measure is devised and enacted early in the first session of the 75th Congress in 1937, which will lessen the harm already done by the enactment of the very burdensome Revenue Act of 1936. Apparently, the Treasury realizes that the Revenue Act of 1936 is going to be extremely difficult to administer. The Treasury before now has had its troubles as the result of the abolition of the consolidated returns provisions in the Revenue Act of 1934, and it is not too much to hope that some constructive work may be done in the coming session of the Congress.

In the meantime, the Rules and Regulations Section in the Bureau of Internal Revenue has been grinding out

"Treasury Decisions" which have the force and effect of regulations under which the Revenue Act of 1936 is to be administered. Particularly interesting are the regulations made public this month relating to the tax on undistributed earnings of corporations and also on the liquidation of corporate subsidiaries under Section 112 (b) (6) of the Act. This corporate liquidation section is particularly interesting since the right of the consolidated return was swept away by the Revenue Act of 1934. The American Mining Congress brought Section 112 (b) (6) before the Committee on Finance of the U. S. Senate when the Revenue Act of 1935 was under consideration and the Committee accepted the section. After being passed by the Senate, however, the Conference Committee, under the advice of the Treasury experts so amended Section 112 (b) (6) as to render it unworkable in practice. This year, the American Mining Congress again urged upon the Finance Committee the necessity for a clarification of this section and as the result of the work of the Finance Committee, the Treasury experts and the staff of the Joint Committee on Internal Revenue Taxation, suitable amendments were adopted, making it possible to liquidate subsidiaries and simplify corporate structures without incurring disastrous tax liabilities. This accomplishment has now been supplemented by the work of the Rules and Regulations Section of the Bureau of Internal Revenue and represents a constructive oasis in the development of what is otherwise felt by industry, large and small, as well as by banking and investment centers, as being a harmful enactment.

Study, inquiry, and discussion have brought little, if any, light during the past month on the ultimate functioning and result of the Robinson-Patman Act. It is felt in Washington, as well as in many other parts of the country that this Act is the child of a hodge-podge, battle royal, tug-of-war, dominated by the call of political expediency. The Federal Trade Commission is unable to make a clarifying statement or declaration on the Act. Inquiries on the part of those charged with the management of industrial enterprise are met with courtesy, but without definite answer. It is the general opinion that numerous court decisions will be required before any comprehensive understanding of the meaning and intent and application of the Act can be had.

The Department of Labor continued, during the month, to work on the regulations under which the Walsh-Healy Government Contracts Act will be administered. The Act becomes effective September 28, 1936. It is understood in Washington that the Department of Labor is not at all satisfied with the law as enacted and it is considered probable that further amendments will be placed before the coming session of the 75th Congress. It is thought quite possible that the regulations will pay preferred attention to the safety and health provisions of the Walsh-Healy Act inasmuch as it is understood that the Department of Labor feels that much of what they desire to accomplish can be done through the authority granted in the Act under these provisions.

The LaFollette Subcommittee of the Committee on Education and Labor of the Senate went into action during the month under authority granted by a Senate Resolution for an investigation into alleged labor espionage. At a hearing, five officials of one of the nationally known detective agencies failed to appear because of an order granted by a lower court of the District of Columbia. Senator LaFollette has since caused these five officials to be indicted by the Grand Jury of the District of Columbia and it has been announced that the Committee will press for conviction and punishment under the law.

The quarrel between the American Federation of Labor and the Committee for Industrial Organization has resulted this month in the expulsion of ten of the twelve unions affiliated with the C. I. O. from membership in the A. F. of L. The ten unions were given until September 5 to sever their connection with the Committee for Industrial Organization and on that date the suspension and expulsion order became effective. It is apparent that the Committee for Industrial Organization intends to pursue its program without regard for the action of the American Federation of Labor. While the whole affair appears to be a wide-open break in the organized labor forces of this country, it is entirely possible that some mutually tenable ground may be found and that by the time the 75th Congress is in session, the organized labor elements of this country will again present a united front before the committees of the Congress and the Executive Departments of the Government.

—*Horydczak.*

Eagle in Stone on Each Corner of Both Pediments, Archives Building, Washington, D. C.

● REPRESENTATIVES of the American Mining Congress have held conferences recently with experts of the Bureau of Internal Revenue regarding the definition of "wages" under the unemployment compensation and old age benefit tax sections of the Social Security Act. "Regulation 90" governing the unemployment compensation tax have already been issued and Regulation 91, governing the old age benefits, are in the course of preparation.

In the determination of wages in the mining industry for the purpose of paying taxes on employe's earnings, the American Mining Congress seeks to avoid having employers pay taxes on explosives and similar material furnished contract miners. The industry's representatives have pointed out to the Federal tax experts that the general practice is and that contract wage agreements invariably call for the miner to furnish his own explosives, which are in turn sold him at cost prices by the operator. To require the employer to pay the unemployment compensation and old age benefit tax on that part of the wages paid for explosives is held to be unfair. No decision on the matter has yet been reached and further conferences are scheduled.

Meanwhile the Bureau of Internal Revenue continues to issue regulations and orders seeking to further clarify various provisions and sections of the new Revenue Act of 1936. The latest issued are Treasury Decision 4677, relating to nonrecognition of gain or loss upon receipt by corporation of property, and basis of property, distributed in complete liquidation of another corporation (Sec. 112 (b) (6) and 11 (a) (15)); Treasury Decision 4678 relating to taxation of mutual investment companies.—(*American Mining Congress Bulletin.*)

D. A. Callahan

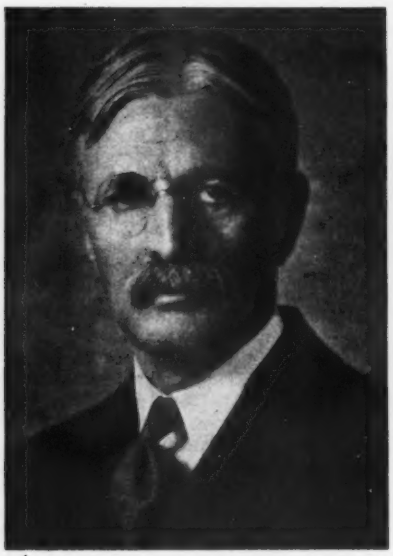
Chas. H. Segerstrom

A. E. Bendelari

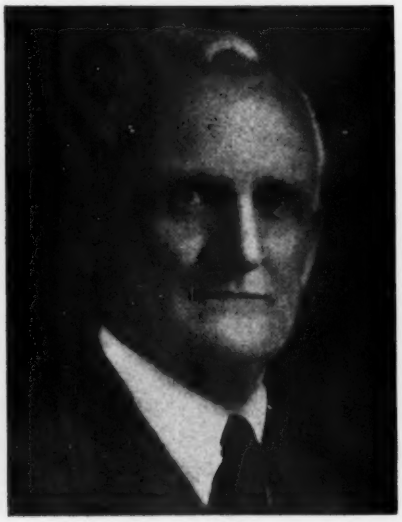
Representatives of the Metal Mining Industry

Jas. R. Hobbins

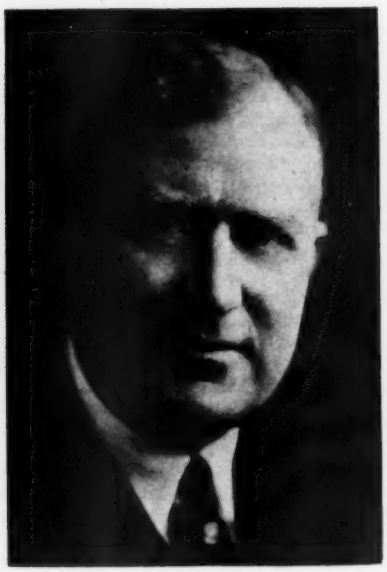
on the Board of Directors



Clinton H. Crane



Donald B. Gillies

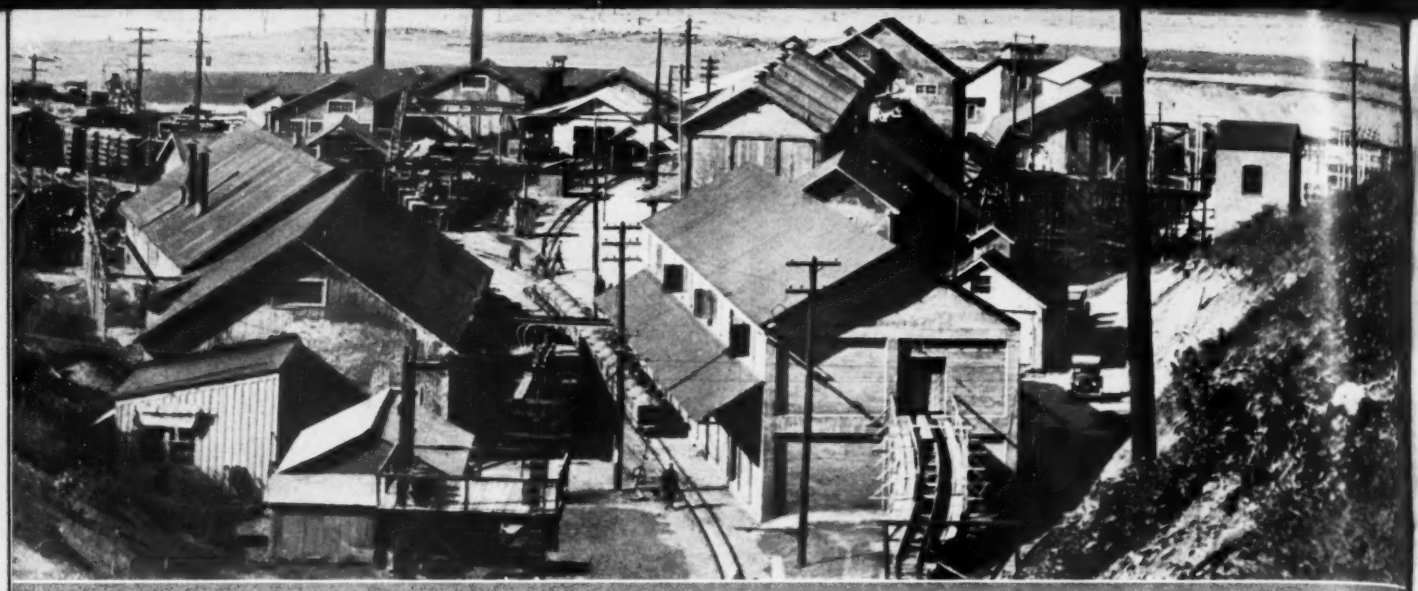


D. D. Moffat

Great Mines of the West

and

The Men Who Have Made Them



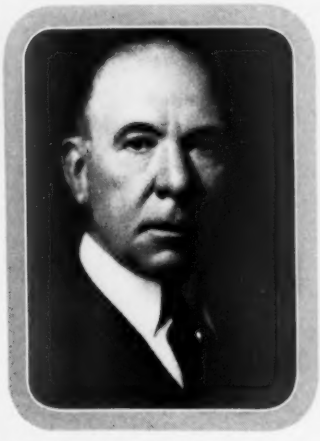
Bunker Hill and Sullivan Mining and Concentrating Co.

THE operations of the Bunker Hill & Sullivan Mining and Concentrating Company, Kellogg, Shoshone County, in the Coeur d'Alene mining district of northern Idaho, are the mining, reduction and sale of the ores from a compact group first known as the Bunker Hill, Sullivan, Stemwinder, Tyler, Last Chance, Sierra Nevada, Caledonia and other mines, an area of some three thousand acres of mineral land and have been well known to the mining profession and the public for over 35 years.

The operations of the Bunker Hill & Sullivan Mining and Concentrating Company are best known for the long period of uniform and regular productivity which extends over four decades, during which time many important and interesting practices have been developed both in its mines and metallurgical establishments. A like important circumstance is the diversity of the product of the operation and the fact that it is all accomplished at one place by one organization; there are produced from its own and purchased ores ready for the consumer: Bunker Hill brand 99.99 corroding lead, fine silver, fine gold, and copper bearing by-products; from its affiliated operation, The Northwest Lead Co., manufactured lead products and from the Sullivan Mining Company, Bunker Hill brand 99.99 plus zinc, and the highest grade of cadmium.

This accomplishment is the result of years of growth and expansion, all of which has been financed by earnings of the parent mine and almost wholly the result of the research and design of the local staff. All of the above metals are now being produced in the largest quantity and of the utmost purity attained at any time by the Bunker Hill & Sullivan Mining and Concentrating Company. It is unusual that a mining enterprise after so many years of productive life is yet able to display real powers of expansion and growth determined only by the demand and price for its product.

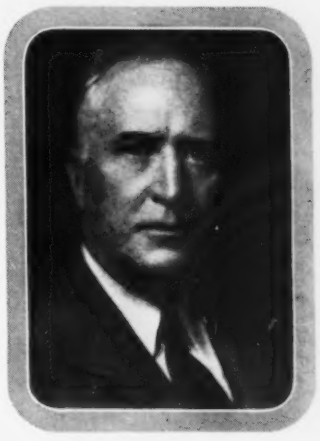
—Utah Copper Company—



D. C. Jackling, President

THERE has been produced from the Bingham deposit 3,957,000,000 pounds of copper since the Company's inception in 1904. This is the largest amount of copper produced to date from any single deposit in the world.

To produce this copper, 228,000,000 tons of ore has been mined and milled and 124,000,000 cubic yards of overburden removed, a total of 485,000,000 tons of material. This is equivalent to 8.16 net pounds of copper per ton of material moved.



D. D. Moffat, Vice President

Launched through the initiative and personality of the "Father of Porphyries," Daniel C. Jackling, the Utah Copper Company was organized in 1904 to exploit a mountain of ore which during the preceding 40 years had received the attention of widely experienced mining men only to be repeatedly rejected because the ore was considered too low grade for a successful mining venture. Jackling's pioneering achievement at Utah paved the way for the development of the "Porphyry Coppers" in Nevada, Arizona, New Mexico and in Chile, a group of mines that in a recent year produced nearly 40 per cent of the world's copper. During the last decade and a half the group has produced over one-third of the world total. Utah, for years, has produced approximately one-seventh of the domestic production, equivalent to about 6 per cent of the world total.

The Utah Copper enterprise was initiated on 2 per cent ore when copper was selling close to 15c per pound. Today, copper is produced from a 1 per cent ore with copper selling under 10c per pound.

Profitable operations of today on less than a $2.50 ore contrasted with the $6.00 ore at inception reflects remarkable progress in methods and equipment, resulting in making tremendous tonnages of low grade ores profitable of treatment.

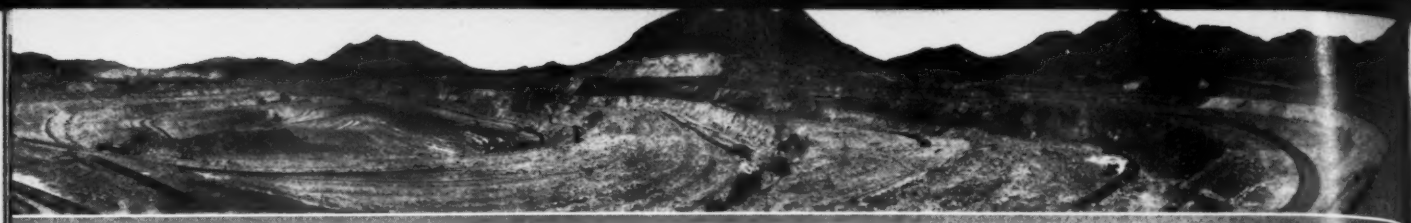
Erle V. Daveler, Treasurer

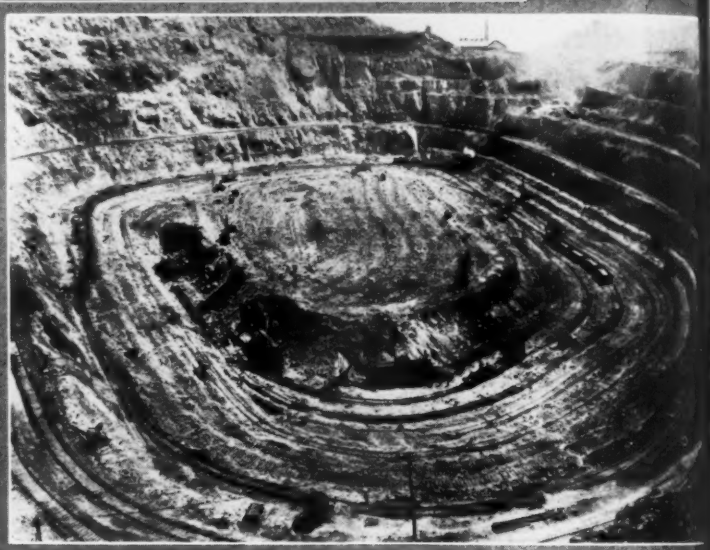
Since the Company's inception there has been paid:

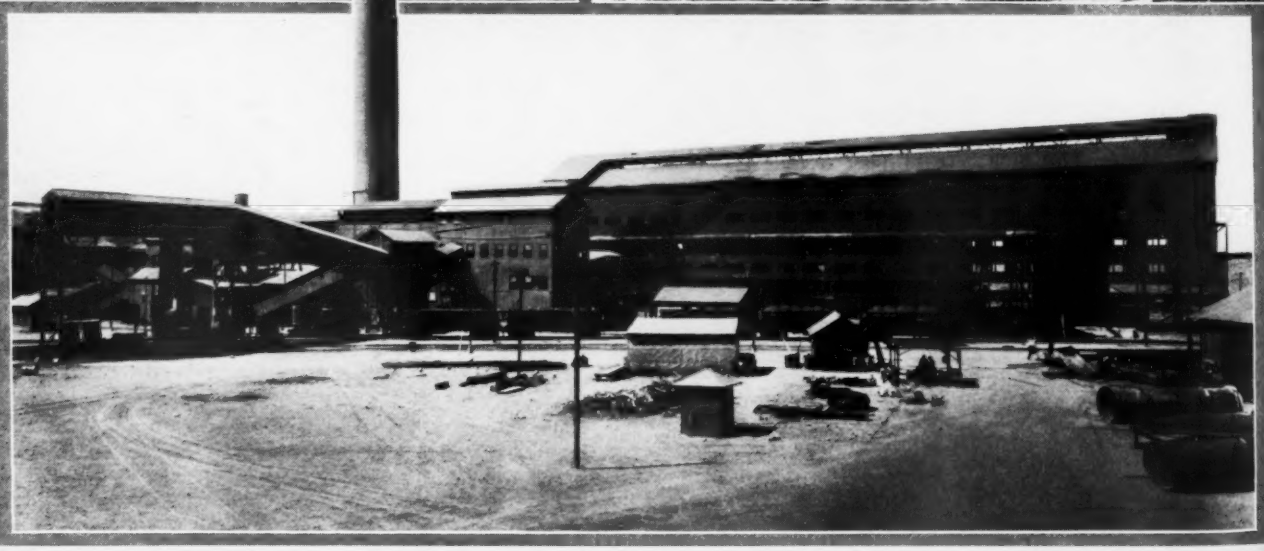
$112,000,000 for wages.
$134,000,000 for power, supplies, services, etc.
$123,000,000 for smelting, freight and refining.
$ 36,000,000 for taxes.

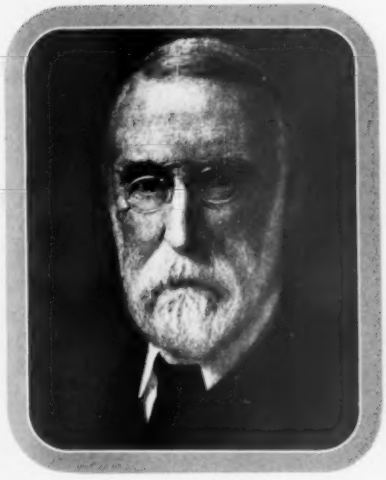
Of the above about $325,000,000 has been expended in Utah, making it her most valuable resource.

Wm. S. Boyd, Vice President









DR. JAMES S. DOUGLAS

WALTER DOUGLAS

—Phelps Dodge Corporation—

RANKING among the three largest copper producing companies in the World, the business of Phelps Dodge Corporation comprises an integrated operation in the copper industry with mines in Bisbee, Ajo, Jerome, and Morenci, Arizona; Tyrone, New Mexico; and Sonora, Mexico. Smelters are located at Douglas, Clifton, and Clarkdale, Arizona. Refining plants at Laurel Hill, New York; and El Paso, Texas. The Corporation also owns and operates coal mines at Dawson, New Mexico and Mercantile Stores at Bisbee, Ajo and Douglas, Arizona, and Dawson, New Mexico. Fabricating plants are owned and operated at Bayway, New Jersey; Yonkers, New York; Fort Wayne, Indiana; and Los Angeles, California.

From the mines of the Corporation are produced copper, gold, silver and coal. In addition to copper in marketable forms, the refineries also turn out copper sulphate, copper oxide, refined and crude nickel sulphate. The Fabricating divisions supply a wide variety of products, the principal outlets of which are the public utilities, railroads, automotive, and industrial building trades.

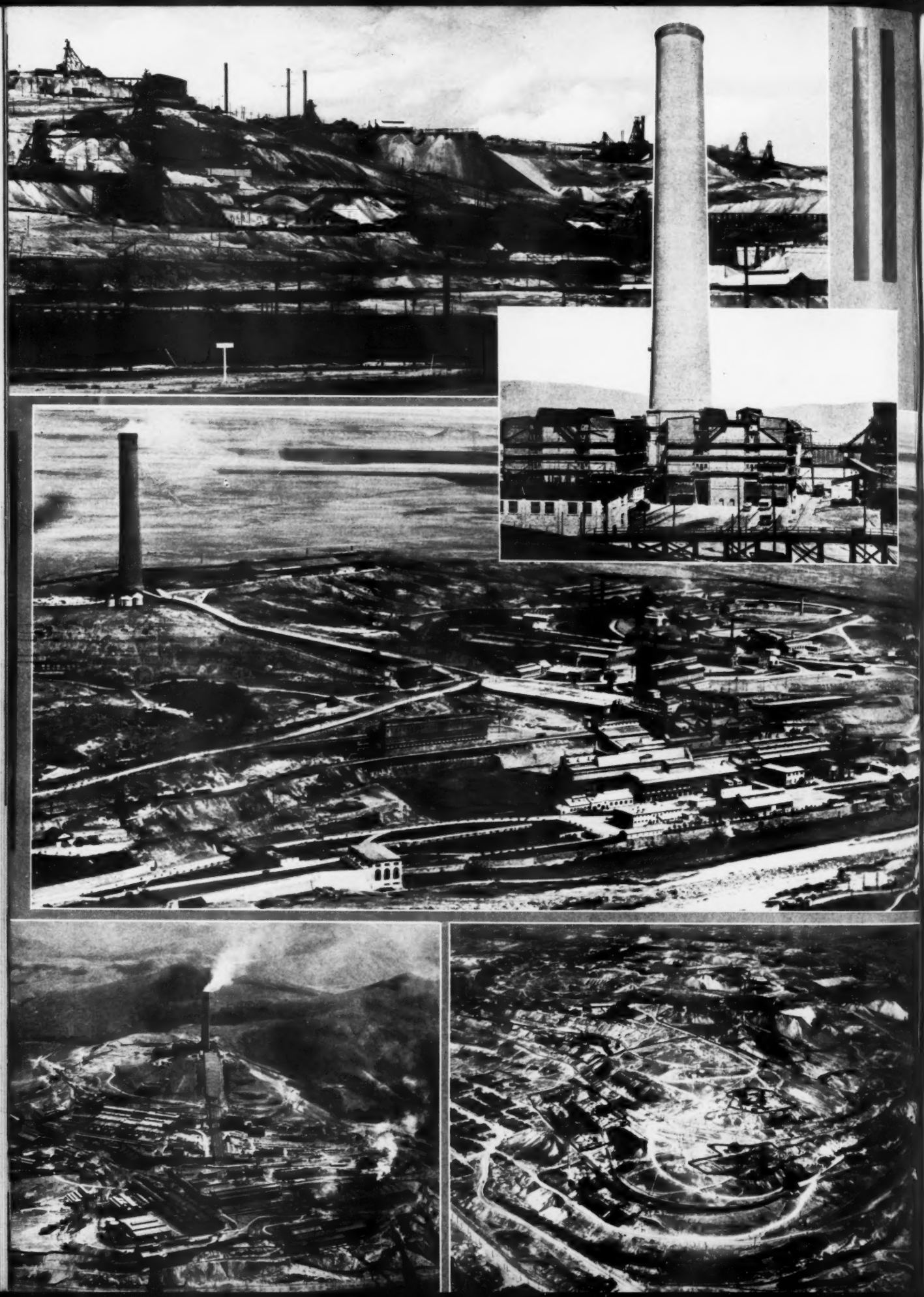
LOUIS S. CATES

THE NEW CORNELIA MINE

The ore body at Ajo, acquired by Phelps Dodge in 1931, is a large porphyry deposit containing disseminated copper sulphides. The Ajo District, next to Santa Rita, New Mexico, is claimed to have been the first copper district in the Southwest worked by Americans. In the 60's or even earlier, high-grade native copper and cuprite ore was mined from shallow surface workings and hauled by bull teams 400 miles across the desert to San Diego. From there it was carried in sailing ships to Swansea, Wales. Bat-infested old workings and the massive axles of the bull carts are shown to prove the truth of the stories. At the present time, mining is done in an open pit with steam and electric shovels and there is a modern and efficient concentrating mill from which concentrates are shipped to Douglas for smelting.

Louis Shattuck Cates, President of Phelps Dodge Corporation, has been identified with western mining activities since the early part of the century, and he was the first engineer to introduce the underground method of caving on a large scale in the Arizona field. Mr. Cates was president of the American Mining Congress in 1925 and is now vice president and director of the American Institute of Mining and Metallurgical Engineers; a director of the Mining and Metallurgical Society of America—of which he was president in 1931; and a trustee of the Massachusetts Institute of Technology. He recently received the honorary degree of Doctor of Engineering from the Michigan College of Mining and Technology.

P. G. BECKETT



—Anaconda Copper Mining Company—

Jes. R. Hobbins C. F. Kelley Wm. B. Daly

BUTTE HILL is one of the wonders of the world. Inside a thousand-acre tract Nature has so concentrated gold, silver, copper, zinc, lead and manganese that fifty years of human toil have not served to exhaust the deposits. And while all prophecy is fallible, it is commonly predicted that the efforts of two or three generations to come will not complete the story of "The Richest Hill on Earth."

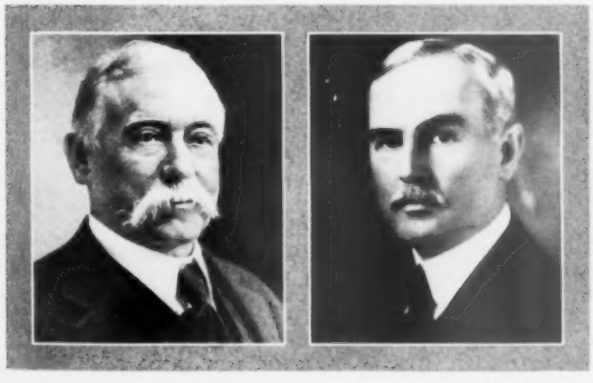
During its first 50 years Butte produced:

1. More copper and more silver than any other district in the world.
2. One-third of all the copper mined in the United States.
3. One-sixth of all the copper mined in the world.
4. In round figures, more than $2,000,000,000 in mineral wealth.

Butte produced, in 40 years, 120,000,000 tons of copper ore. A single train transporting this ore would stretch half way around the globe.

In Anaconda, 25 miles west of Butte is located the Anaconda Reduction Works, including the largest non-ferrous smelter in the world, which can handle 16,000 tons of ore a day. "Blister" copper is produced in the form of anodes, which are shipped to Great Falls for refining. A plant producing zinc concentrates and electrolytic zinc has a capacity of 10,000,000 pounds per month. .There is also a sulphuric acid plant and a dust treating plant from which arsenic is recovered. By treating phosphate rock with sulphuric acid, Anaconda Treble Superphosphate is manufactured at the rate of 120 tons per day. A brass and iron foundry and brick plant are also operated. The 585-foot chimney is known as "The Big Stack," the largest in the world.

At Great Falls are located the electrolytic copper, and electrolytic zinc plants and the rod and wire mills of the Anaconda Wire & Cable Company. The copper refinery has a capacity of 27,000,000 pounds per month and the zinc plant 20,000,000 pounds per month—the latter requiring 81,100 horse power of electrical energy. The rod and wire mill has these capacities: 300,000,000 pounds of rods and 70,000,000 pounds of wire per year.



Marcus Daly John D. Ryan

Anaconda's great organizers include first, Marcus Daly, who combined with the impulsiveness of the Celt a rare sense of leadership and an intimate knowledge of men and conditions in Montana. For a quarter of a century Mr. Daly's efforts centered at the sources of production. His invaluable contribution to Anaconda was made during the constructive period on the Hill.

Then came the organization of the Amalgamated Company through the genius of Henry H. Rogers, skilled master of capital and of the means of production and distribution.

Anaconda entered its third era under the leadership of John D. Ryan. Under him, nine competing, controversial copper properties were harmonized and merged in one, the Anaconda. Large operations became larger. New and amazing recovery processes were introduced. A great power enterprise was developed and the application of electricity to practically all operations in mines, mills and smelters became a reality.

Later, in close association with Cornelius F. Kelley, Mr. Ryan's successor in the presidency, the Company's activities were extended to other states and other lands. Enterprises in California, Idaho, Utah, Arizona, Indiana and New Jersey entered the fold. Then came American Brass, Chile Copper and operations in Germany and Poland.

In President Kelley are combined an exact knowledge of local conditions, marked aptitude in the field where Mr. Ryan was a leader, and a glorious vision all his own of the kind of job Anaconda has tackled in trying to bring stability to one of America's basic industries and assurance and confidence to the thousands who produce, and the millions who use, the enduring metals.

—*The Golden Cycle Corporation*—

THE present Golden Cycle Corporation was originally a gold-mining project to develop mines in the Cripple Creek District. The property worked was called the Golden Cycle. There was added to this the Theresa, an adjoining property. Development work opened various veins—The La Bella, Carr, Revenue, Ready Money, etc., which were producers of a large amount of better-than-the-average grade of Cripple Creek ores.

The owners were first Smith, Moffat and others, H. L. Shepherd, Jno. T. Milliken and associates. The last owners were fortunate in mining at the horizon of best ore.

They also at this time acquired the Theresa, built the mill at West Colorado Springs, which originally was a chlorination plant and later changed to cyanide.

In 1915 Mr. A. E. Carlton and associates acquired the mill and mine. A number of changes were made in the mill; a coal property near Colorado Springs developed into a profitable mine. The railroad from Colorado Springs to Cripple Creek was later added to the enterprise.

\+ + +

The Corporation owns:

Mill in West Colorado Springs treating from 500,000 to 600,000 tons gold ores a year.

The Ajax, Granite, Anchoria Leland mines, about 350 acres in Cripple Creek District.

Pikeview Coal Mine, 2,300 acres of very good grade of coal used locally and also to generate power for mill and mine.

The Midland Terminal Railway Company, operating about 100 miles of mountain railways, owning its own equipment.

\+ + +

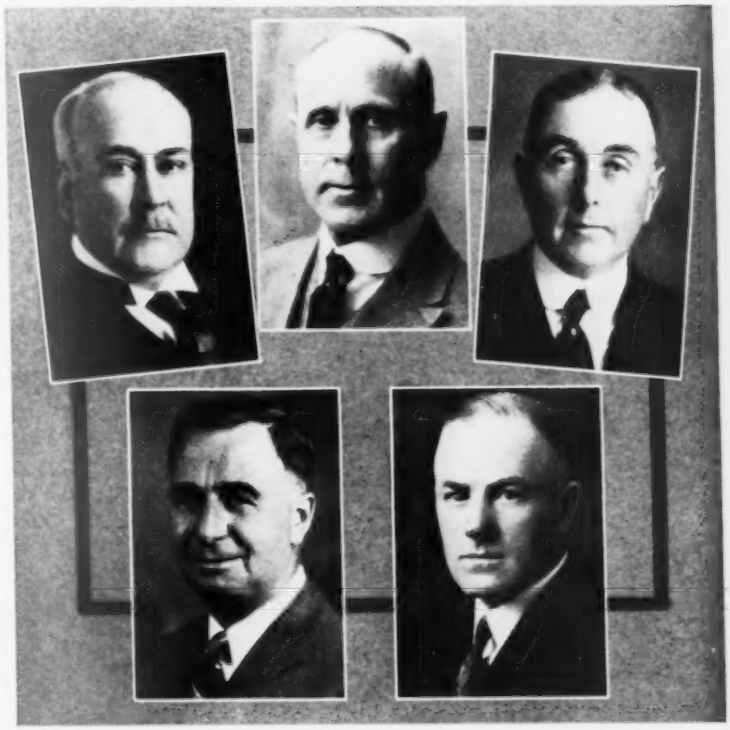
The Golden Cycle mine was sold to the Vindicator Cons. G. M. Co. and later, when the Vindicator sold its property to the United Gold Mines Co., became the property of that company.

The Milling Company, under the direction of A. L. Blomfield, L. S. Harner and Max Bowen, its present superintendent, has kept up to date on changes required by milling different types of ore and changing conditions.

Its dividend record of $15,043,008.97 paid since formation of the corporation under the management of Mr. Milliken to June 10, 1936, is very good. During the depression it not only paid regular dividends, but increased them.

The mill is now treating a larger tonnage than at any time in its history. Ten per cent is miscellaneous ore and 90 per cent Cripple Creek ore; of this 90 per cent, 80 per cent is produced from mines under supervision of the present management of the corporation.

—Homestake Mining Company—



Upper row, left to right: Edw. H. Clark, Pres.; B. C. Yates, Gen. Mgr. (recently deceased); Allan J. Clark, Metallurgical Supt. Lower row, left to right: A. J. M. Ross, Mine Supt.; Guy N. Bjorge, Asst. Gen. Mgr.

GOLD in the Black Hills was discovered by Custer's men in 1874 and the "Lure of Gold" soon brought prospectors and adventurers to the hills in great numbers. The Homestake Lode was discovered by Moses Manuel on April 9, 1876.

Early in 1877 the members of a San Francisco Syndicate, consisting of George Hearst, Lloyd Tevis and J. B. Haggin, sent Samuel McMaster to report on a silver mine near Deadwood, South Dakota, the outcome of which was unfavorable. While in the district, however, he investigated reports of gold discoveries in Gold Run Canyon and this resulted in the purchase of two claims, known as the Homestake and Golden Star.

Such was the beginning of the Homestake Mining Company, one of the great gold mining enterprises of the world. Since that there have been mined 65,000,000 tons of ore containing approximately one-fifth of an ounce of gold per ton. At the present time the annual output averages 1,400,000 tons, with a gold content of one-third of an ounce per ton.

\+ + +

SIGNIFICANT FACTS:

PRODUCTION from the property has now exceeded $300,000,000.00

EXPENDITURES—Approximately two-thirds of this amount has been expended for wages, equipment and supplies. In the past ten years, 1926-1935, wages alone have exceeded $31,500,000.00.

MEN EMPLOYED—Prior to 1929 the number of men employed averaged about 1,600. Since that the number has grown to 2,200 and wages are now 20 per cent above the 1929 peak.

NEW PLANT—During the past four years $4,500,000.00 has been expended for new plant construction.

TAXES—During 1935 State and Federal Taxes amounted to a total of $2,156,503.84, or $1.56 per ton of ore mined.

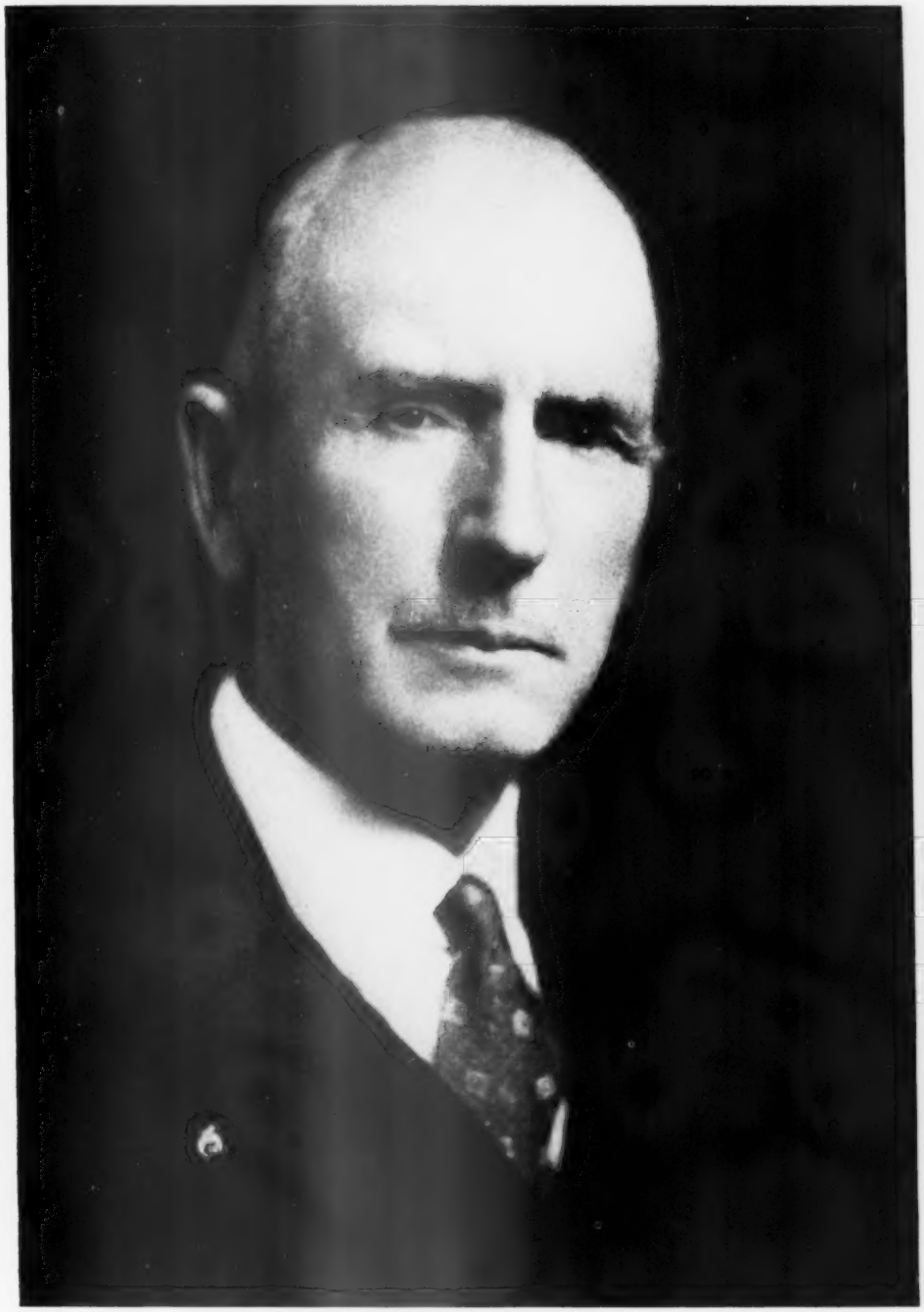
Samuel McMaster became the first superintendent of the mine and directed its early development and equipment. McMaster died in 1884 and T. J. Grier became superintendent. Mr. Grier, though not a mining man, proved to be an organizer and administrator of great ability. Under his administration the Homestake expanded until it became one of the great gold mines of the world. For nineteen years, Mr. B. C. Yates was General Manager of the Homestake Mining Company and under his able leadership the operations continued to expand, the plant was completely modernized, and great progress was made in what may be termed social or human engineering.

Mr. Edward H. Clark has been President of the Homestake Mining Company since 1914. The outstanding success of the operation has been largely due to his guiding hand in directing its policy.

HOWARD I. YOUNG

President, The American Mining Congress

Mr. Young is President of the American Zinc, Lead & Smelting Company



JESSE F. McDONALD

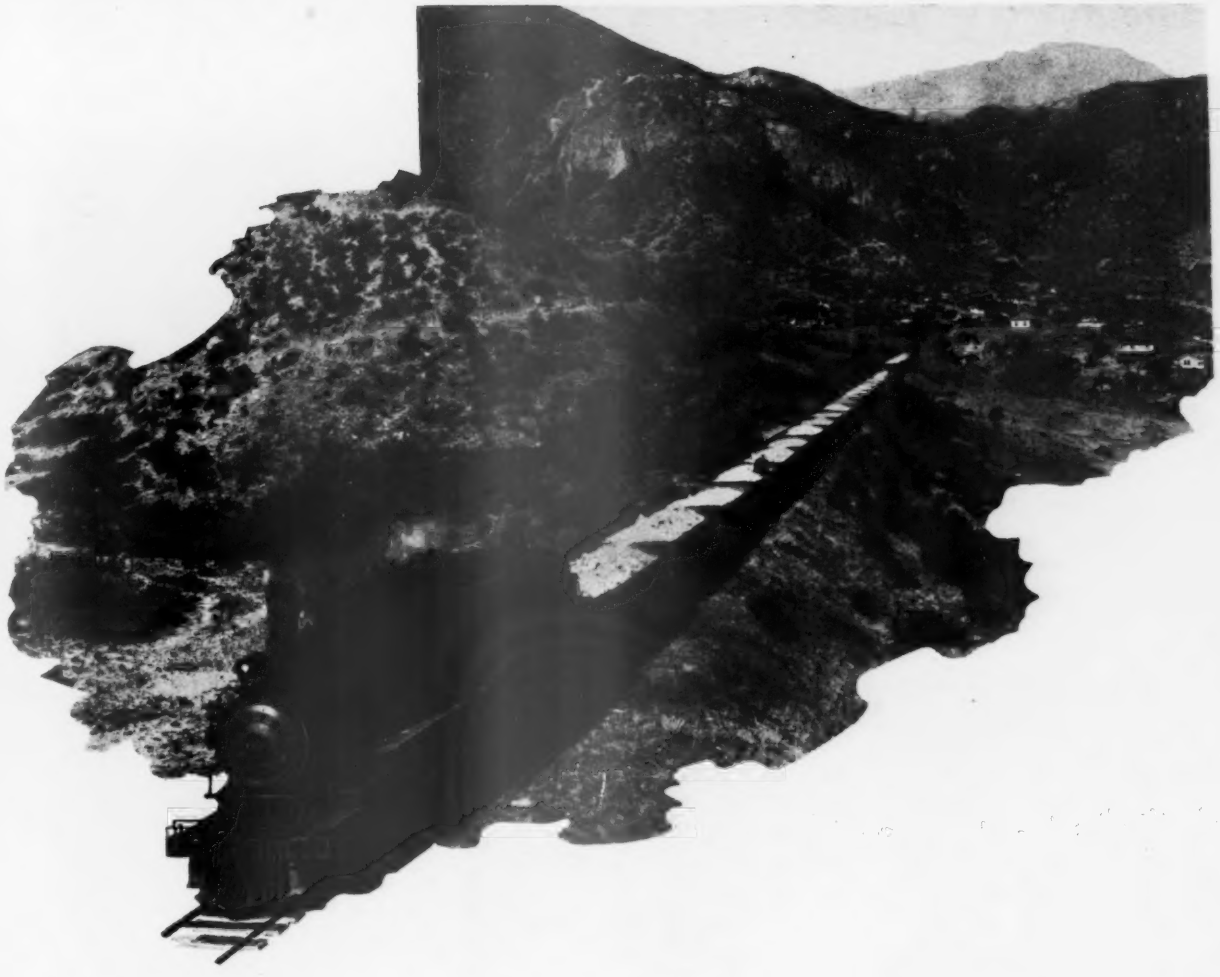
Chairman, Board of Governors,
Western Division, The American Mining Congress

Mr. McDonald is President of the Downtown Mines Co.

STANLY A. EASTON

Chairman, Program Committee,
Annual Convention, Western Division,
The American Mining Congress

Mr. Easton is President of the Bunker Hill & Sullivan Mining & Concentrating Co.



Metal Mining Convention . . .

COLORADO, whose history is so closely identified with the development of metal mining in the United States, is preparing a splendid reception to the mining men from all parts of the country who will attend the annual meeting of the Western Division of the American Mining Congress, to be held in Denver's City Auditorium, September 28 to October 3. Cooperating with the convention and with the local committees is the Colorado Chapter, The American Mining Congress, and the Colorado Mining Association. The Honorable Ed. C. Johnson, Governor of Colorado, will extend a cordial welcome; the Mayor of Denver, the Honorable Ben F. Stapleton, will address the opening session, and each mining district will add its own particular brand of welcome to the several hundreds in attendance.

The dates—September 28-October 3—mark an important period for the metal mining industry. Each year at approximately this date the Western Division has held its annual meeting at a western point. The deliberations of these meetings furnish a platform for united action upon problems of common interest.

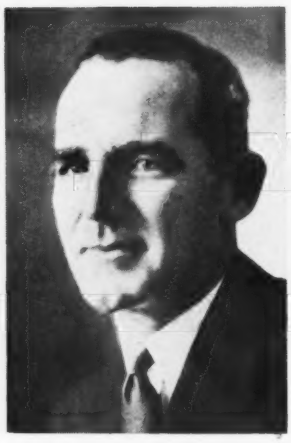
The Honorable Jesse F. McDonald, former Governor of Colorado, president of the Downtown Mines Company, and closely identified with the metal mining industry of the state, is chairman of the Board of Governors of the Western Division, and is the official host for the convention. Under his direction the various groups, comprising the Local Committee on Arrangements, are functioning to make this meeting an outstanding success. Serving with Mr. McDonald on the Board of Governors of the Division, are:

Roy Earling, U. S. Smelting Refining & Mining Co.
P. G. Beckett, Phelps Dodge Corp.
R. E. Tally, Prescott, Ariz.
F. C. van Deinse, Yuba Cons. Gold Fields.
Wm. A. Simkins, Empire Star Mines Co., Ltd.
Charles A. Chase, Shenandoah-Dives Mng. Co.
Geo. H. Rupp, Colo. Fuel & Iron Corp.
Henry Lawrence Day, Hercules Mng. Co.
Stanly A. Easton, Bunker Hill & Sullivan M. & C. Co.
Wm. B. Daly, Anaconda Copper Mng. Co.
J. D. MacKenzie, Amer. Smelt. & Refining Co.
H. A. Johnson, Tonopah Mng. Co.
J. C. Kinnear, Nevada Cons. Copper Corp.
R. B. Tempest, Nevada Cons. Copper Corp.
Ira L. Wright, Black Hawk Cons. Mines Co.
Robt. M. Betts, Quicksilver Syndicate.

Robt. M. Hardy

W. P. Chinn

Guy N. Bjorge



Geo. W. Potter

J. C. Kinnear

E. H. Wells

T. H. O'Brien

Geo. W. Potter, Eagle Picher Mng. & Smelting Co.

J. A. Robinson, Commerce Mng. & Royalty Co.

Brent N. Rickard, American Smelting & Refining Co.

H. F. Treichler, Texas Gulf Sulphur Co.

E. A. Hamilton, U. S. Smelting Ref. & Mining Co.

W. Mont Ferry, Silver King Coalition Mines Co.

Lewis P. Larsen, Pend Oreille Mines & Metals Co.

Milnor Roberts, Prof. of Mng. & Metallurgy, Univ. of Wash.

R. W. Thomas, Governor, Arizona Chapter, A. M. C.

G. Chester Brown, Sec., Calif. Metal & Mineral Producers Assn.

Julian Boyd, Mining Association of the Southwest.

Robert S. Palmer, Sec., Colorado Chapter, A. M. C.

J. W. Gwinn, Sec., Idaho Mining Assn.

Carl J. Trauerman, Pres., Montana Mining Assn.

Henry M. Rives, Sec., Nevada Mine Operators Assn.

J. F. Woodbury, Sec., New Mexico Chapter, A. M. C.

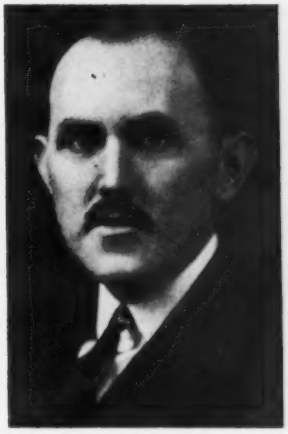
M. D. Harbaugh, Sec., Tri-State Zinc & Lead Ore Prod. Assn.

A. G. Mackenzie, Sec., Utah Chapter, A. M. C.

STANLY A. EASTON, president, Bunker Hill & Sullivan Mining and Concentrating Company, Kellogg, Idaho, is national chairman of the Program Committee for the convention and under his direction a program of note has been arranged. Serving with him, as members

H. E. Treichler

Chas. A. Chase



H. A. Coy

Walter C. Clark

Clinton M. Roos

Jas. W. Wade

of the Program Committee, are 95 representatives from the metal producing districts. The committee has worked diligently since early May, and the result they have obtained should meet with the hearty approval of mining men generally. Committee meetings have been held, questionnaires submitted, and suggestions have been received from hundreds of mining men throughout the country. It has been no small job to select the papers which comprise the program, but as arranged it covers a large number of subjects, and presents something of interest for every district and for every individual. Those serving with Mr. Easton on the Program Committee are:

ARIZONA

T. H. O'Brien (state chairman), G. M., Inspiration Cons. Copper Co.

Wm. Koerner, G. M., Magma Copper Co.

P. G. Beckett, V. P. and G. M., Phelps Dodge Corp.

C. R. Kuzell, Smelter Supt., United Verde Br., Phelps Dodge Corp.

M. Curley, Mgr., New Cornelia Br., Phelps Dodge Corp.

Chas. F. Willis, publisher, THE MINING JOURNAL.

CALIFORNIA

John A. Burgess (state chairman), Carson Hill Gold Mng. Corp.

C. A. Norris, Secy., Atolia Mng. Co.

Victor Bongard, G. M., Cardinal Gold Mng. Co.

Thomas McCormack, Pres., Natomas Co.

F. C. van Deinse, V. P., Yuba Cons. Gold Fields.

COLORADO

Charles A. Chase (state chairman), G. M., Shenandoah-Dives Mng. Co.

John A. Burgess

Andrew A. Zangara, St. Joe Mng. & Milling Co.
Wm. J. Coulter, G. M., Climax Molybdenum Co.
Geo. H. Rupp, Mgr. of Mng. Dept., Colorado Fuel & Iron Corp.
F. W. Marcroft, Colorado Springs.
Ezra D. Dickerman, Engr., Gold Belt Mines Corp.
F. D. Willoughby, Pres. and Gen. Mgr., Midnight Mng. Co.
J. P. Channell, Durango Chamber of Commerce.

IDAHO

Walter C. Clark (state chairman), Bunker Hill & Sullivan Mng. & Conc. Co.
C. E. Nighman, Mng. Engr., Boise.
Donald A. Callahan, Wallace.
J. F. McCarthy, Pres., Hecla Mng. Co.
Henry Lawrence Day, Asst. Mgr., Hercules Mng. Co.
Frank Eichelberger, Kellogg.
H. G. Washburn, G. M., Federal Mng. & Smelting Co.
Arthur Campbell, Inspector of Mines.

MONTANA

Clinton M. Roos (state chairman), Helena.
Wm. B. Daly, Mgr. of Mines, Anaconda Copper Mng. Co.
Gust Carlson, Montana Mines Corp.
Carl J. Trauerman, Pres., Ruby Gulch Mng. Co.
Pearl I. Smith, Crystal Graphite Co.
J. D. MacKenzie, Mgr., E. Helena Plant, Amer. Smelting & Ref. Co.

NEVADA

J. C. Kinnear (state chairman), G. M., Nevada Cons. Copper Corp.
H. A. Johnson, G. S., Tonopah Mng. Co.
Tasker L. Oddie, Reno.
Louis D. Gordon, G. M., Penelas Mng. Co.
Ott F. Heizer, Mgr., Nevada-Mass. Co., Inc.

NEW MEXICO

E. H. Wells (state chairman), Pres., New Mexico School of Mines.
H. M. Albright, V. P. and G. M., U. S. Potash Co.
Ira L. Wright, Black Hawk Cons. Mines Co.
Frank W. McLean, Supt., Peru Mng. Co.
C. S. Elayer, Mine Supt., Ground Hog Unit, Asarco Mng. Co.
R. B. Tempest, G. M., Nevada Cons. Copper Corp.
J. T. Matson, G. M., American Metal Co. of New Mexico.

SOUTH DAKOTA

Guy N. Bjorge (state chairman), Asst. G. M., Homestake Mng. Co.

TEXAS

H. E. Treichler (state chairman), G. M., Texas Gulf Sulphur Co.
John G. Barry, Cons. Mng. Geol. & Engr., El Paso.
J. P. Dyer, Works Engr., Nichols Copper Co.

\+ + +

THE INTER-RELATIONSHIP OF GOVERNMENT AND BUSINESS

It is not necessary to call the attention of business men to the fact that there exists an inter-relationship of government and business which is gradually becoming more and more intimate. There has always been a relationship in this country. It was business men who wrote the Constitution and that document was intended to protect business as well as personal rights. The compelling factor in the formation of the Union was the chaotic condition of commerce between the states.

Nowadays the relationship has assumed a new form. With a vast country to be developed government's concern was to aid business, hence tariffs, land grants to transportation companies, and other inducements to build up the commercial interest of the nation. Today, aside from agriculture, the concern of government is to restrain business, at least by certain groups among our political philosophers.

This type of legislation has lead to the creation of vast administrative bureaus, each empowered to make rules and regulations. No man's business today is sacred against the invasion of agents of the Government seeking to discover infractions, not only of the laws of Congress, but of the rules and regulations made under authority of those laws. Since most business is conducted under a corporate form, Federal and state laws regulating corporation activities, call for intricate methods of accounting, the furnishing of reports upon ever conceivable subject, and, last but by no means least, contributions in the form of taxes to maintain the vast governmental machine.

There is no question but that a government controlled by business might become a very evil government, indeed, for business can be hard and cruel. On the other hand there is no question but that business controlled in its most intimate details by government becomes a very unpleasant, and sometimes, very unprofitable operation. The main concern of business today should be to check the growing tendency toward bureaucratic control of the details of its operation. Laws of Congress openly arrived at may be onerous, but are seldom petty. Rules and regulations of thoroughly educated bureaucrats are framed in secret and carried out in a spirit which results in annoyance and entirely unnecessary expense.

Business has been successful very often in defeating destructive legislation. It finds itself almost helpless in defending against the encroachments of the experts in the governmental bureaus which touch so intimately the conduct of the ordinary affairs of a business enterprise. Business should unite against the ever-increasing tendency of Congress to place power in the hands of departments and bureaus of government. The province within which expert bureaucrats may legislate through rules and regulations should be strictly defined in all legislation affecting the business of the country.

The other side of the relationship should be stressed by business men. Governments, especially those of the modern type, demand ever-increasing revenue and that revenue in our country comes largely from successful well-managed business enterprises. If business is to be the contributing member of this family it should have more to say about the manner in which its money is to be spent. It is bad enough to be called upon for ever-increasing contributions to the public welfare. It is humiliating, to say the least, after making such contributions, to be treated as a poor relation.

Donald A Callahan

President, Callahan Zinc-Lead Co.

\+ + +

UTAH

James W. Wade (state chairman), V. P., Tintic Standard Mng. Co.
J. O. Elton, Mgr., International Smelting & Ref. Co.
Geo. W. Snyder, W. F. Snyder & Sons.
Oscar N. Friendly, Park Utah Cons. Mines Co.
W. J. O'Connor, Mgr., Utah Dept., Amer. Smelting & Ref. Co.
Ernest Gayford, V. P., General Engineering Co.

LAKE SUPERIOR DISTRICT

W. P. Chinn (district chairman), G. M., Pickands Mather & Co.
Clement K. Quinn, Duluth.
Edw. C. Congdon, Congdon Interests.
Stephen Royce, Geol., Pickands Mather & Co.
M. C. Lake, Geol., M. A. Hanna Co.
Harry Vivian, Chf. Engr., Calumet & Hecla Cons. Copper Co.
Max H. Barber, Dist. Supt., Mesaba Dist., Cleveland-Cliffs Iron Co.
J. A. MacKillican, Mgr., Meriden Iron Co.
A. Y. Peterson, G. S. of Mines, Oliver Iron Mng. Co.
Earl E. Hunner, G. M., Iron Mng. Dept., M. A. Hanna Co.
B. M. Concklin, Chf. Engr., Great Northern Iron Ore Properties.
R. O. Hocking, Mgr. of Mines, Butler Bros.

MISSISSIPPI VALLEY

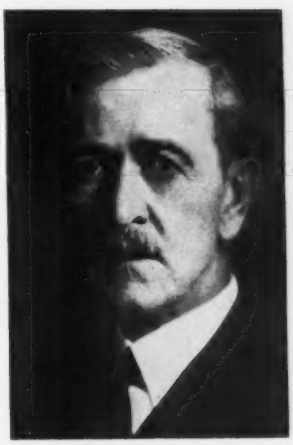
Geo. W. Potter (district chairman), V. P., Eagle-Picher Mng. & Smelting Co.
M. M. Leighton, Chf., State Geol. Survey Div.
F. O. Case, Mgr., International Smelting & Refining Co.
J. A. Caselton, 2nd V. P. and Secy., St. Louis Smelting & Ref. Co.
W. N. Smith, G. M., Vinegar Hill Zinc Co.
L. G. Johnson, Federal Mng. & Smelting Co.
Frank Childress, Miners Bank Bldg.
Chas. A. Neal, Mary M. Mining Co.
F. S. Elfred, Jr., Evans-Wallower Lead Co.

(*Continued on page* 56)

DENVER COMMITTEE ON ARRANGEMENTS FOR THE METAL MINING CONVENTION

Jas. Owen
Chairman

Arthur Roeder

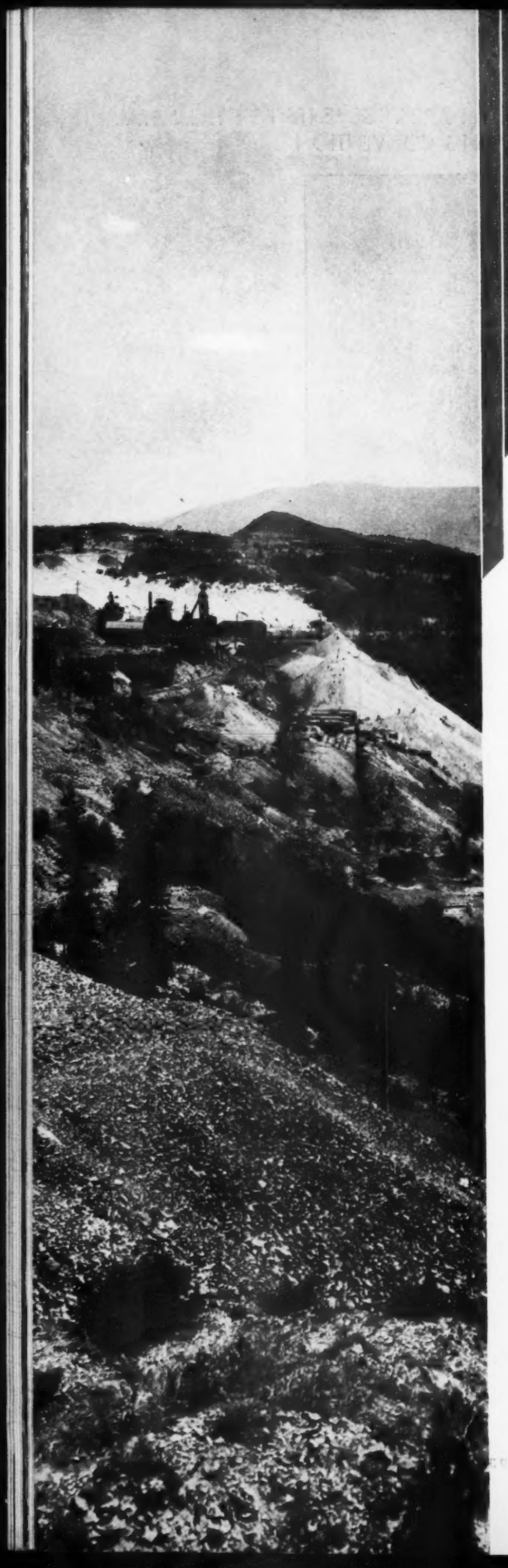


J. O. A. Carper

Adolph F. Zang

T. B. Stearns

Claude K. Boettcher



Pro

METAL MINING CONVENTION, WESTERN CITY AUDITORIUM, DENVER, COLO.,

Monday, September 28

9.00 A. M. REGISTRATION

10.30 A. M.

Chairman: JESSE F. MCDONALD, *Pres., Downtown Mines Co.*

Appointment, Resolutions Committee

Today's Problems

COLONEL WILLARD T. CHEVALIER, *Vice President, McGraw-Hill Publishing Co., Inc.*

Trade Agreements and the Mineral Industries

HERBERT WILSON SMITH, *Union Carbide and Carbon Corpn.*

12.00 Noon. HONORARY LUNCHEON

D. A. CALLAHAN, *President, Callahan Zinc-Lead Company, Presiding*

NOTE: The American Mining Congress was organized in Denver, Colo., and J. F. Callbreath served as Secretary from 1905 to 1934. Organization headquarters were maintained in Denver for many years. This luncheon will be a testimonial to Mr. Callbreath and his work.

Welcome to Colorado

HON. ED. C. JOHNSON, *Governor of the State of Colorado*

HON. BEN F. STAPLETON, *Mayor of the City of Denver*

Response

HOWARD I. YOUNG, *President, The American Mining Congress*

STANLY A. EASTON, *Chairman, Program Committee*

2.30 P. M.

Chairman: W. MONT FERRY, *Vice Pres. and Managing Dir., Silver King Coalition Mines Co.*

Power Developments and Metal Mining

HON. JOHN WELLINGTON FINCH, *Director, U. S. Bureau of Mines*

Recent Developments in Western Mining:

Molybdenum—W. J. COULTER, *Gen. Mgr., Climax Molybdenum Co.*

Tungsten—CHAS. H. SEGERSTROM, *Pres., Nevada-Massachusetts Co.*

Potash—J. J. BOURQUIN, *Dist. Mng. Supervisor, U. S. Geological Survey.*

Mechanical Mucking Underground vs. Slushing

A. C. STODDARD, *Chief Mine Engineer, Inspiration Consolidated Copper Co.*

8.00 P. M. ENTERTAINMENT FEATURE

Tuesday, September 29

10.00 A. M.

Chairman: BRENT N. RICKARD, *Manager, El Paso Smelting Works, American Smelting & Refining Co.*

Mining Roads As Part of Public Works Program

M. F. COOLBAUGH, *Pres., Colorado School of Mines*

World Markets for Non-Ferrous Metals

WALTER RENTON INGALLS, *Director, American Bureau of Metal Statistics*

Applications of Magnetic Work to Exploration

STEPHEN ROYCE, *Geol., Pickands Mather & Co.*

Structure Drilling

H. C. BOLTHOUSE, *Supt., Mesaba Cliffs Iron Co.*

Concentration of Minnesota Low-Grade Iron Ore

GROVER J. HOLT, *Chief Mining Engineer, Butler Brothers*

12.00 Noon. Luncheon

Board of Governors, Western Division. For election of officers and transaction of business.

2.30 P. M.

Chairman: CHAS. H. SEGERSTROM, *President, Carson Hill Gold Mining Corp.*

Regulatory Measures and the Mining Industry

HON. WM. H. KING, *Senator from Utah.*

* Preliminary program.

*gram**

DIVISION, THE AMERICAN MINING CONGRESS
SEPTEMBER 28-OCTOBER 3, 1936

Health Problems in Mining
ANTHONY J. LANZA, M. D., *Asst. Medical Dir., Metropolitan Life Insurance Co.*
Equipment and Methods for Determining Air Dustiness in Mines
CARLTON E. BROWN, *Chemist, Gas Section, U. S. Bureau of Mines*
Discussion:
WM. B. DALY, *Mgr. of Mines, Anaconda Copper Mng. Co.*
Legal Liability in Western States for Interference With Underground Waters by Mining
BAUER E. KRAMER, *Oakland, Calif.*
Presentation of Resolutions

4.00 P. M. DRILLING CONTEST
Old-time miners' hand-drilling championship.

Wednesday, September 30

10.00 A. M.
Chairman: JAMES OWEN, *Denver, Colo.*
Practical Problems Under 1936 Revenue Act
HENRY B. FERNALD, *Chairman, Executive Tax Committee, American Mining Congress*
Legal Features of the 1936 Revenue Act
ELLSWORTH C. ALVORD, *Tax Attorney, Washington, D. C.*
Tax Problems of Western Minerals
JOHN T. BARNETT, *Denver, Colo.*
Administering the 1936 Tax Law
CHARLES T. RUSSELL, *Deputy Commissioner of Internal Revenue*

2.30 P. M.
Chairman: WM. B. DALY, *Manager of Mines, Anaconda Copper Mining Co.*
The Mineral Industry and Transportation
CARL R. GRAY, *President, Union Pacific Railroad Co.*
The Proposed "Mineral States Committee"
M. M. LEIGHTON, *Chief, State Geological Survey Division of Illinois*
NOTE: This conference is proposed to discuss the feasibility of an industry-wide committee to act as a clearing house of information on the economic importance of the mineral industries.
Improved Methods of Sand Shaft Sinking
WM. H. SCHACHT, *Pres., Copper Range Mining Co.*
Cast Iron Paving Blocks
E. W. DAVIS, *Supt. of Mines, Experiment Station, University of Minnesota*

6.30 P. M. ELK BARBECUE
An unusual entertainment, sponsored by the Colorado Group

Thursday, October 1

10.00 A. M.
Chairman: D. D. MOFFAT, *Vice President, Utah Copper Co.*
Recent Legislation—What It Means to Mining
JULIAN D. CONOVER, *Secretary, American Mining Congress*
The Need for United Action
D. A. CALLAHAN, *President, Zinc-Lead Co.*
Open Discussion
By representatives of all districts.
The Gold and Silver Questions
HON. KEY PITTMAN, *Senator from Nevada*

12.00 Noon. LUNCHEON
Board of Directors, The American Mining Congress

(*Continued on page* 54)

Members—Board of Governors Western Divis

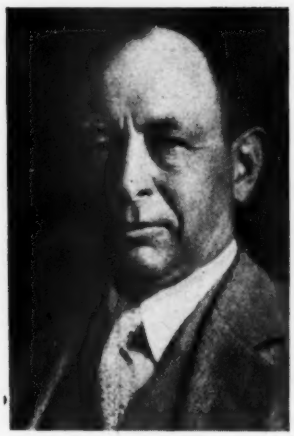
P. G. Beckett

Wm. B. Daly

Milnor Roberts

Wm. A. Simkins

R. B. Tempest



Lewis P. Larsen

Roy Earling

PROGRAM (Continued from page 53)

2.30 P. M.

Chairman: STANLY A. EASTON, *President, Bunker Hill & Sullivan Mining & Concentrating Co.*

Industry's Opportunity

HON. ALVA B. ADAMS, *Senator from Colorado*

Mine Financing As Viewed by Securities and Exchange Commission

HON. JAMES M. LANDIS, *Chairman, Securities and Exchange Commission*

Government and Industry

A round-table discussion of some of the problems facing both government and industry.

Discussion Leader: R. C. ALLEN, *Vice President, Oglebay, Norton & Co.*

CHAS. H. SEGERSTROM, *President, Nevada-Massachusetts Co.*
STANLY A. EASTON, *President, Bunker Hill & Sullivan Mining & Concentrating Co.*
EUGENE MCAULIFFE, *President, Union Pacific Coal Co.*
MAX SCHOTT, *President, Climax Molybdenum Co.*
ARTHUR ROEDER, *Pres., The Colorado Fuel & Iron Corp.*
A. E. BENDELARI, *Pres., The Eagle-Picher Lead Co.*
ROBT. E. TALLY, *Prescott, Arizona.*

Final Report, Resolutions Committee

6.30 P. M. **ANNUAL DINNER**

Guest Speaker—HON. HERBERT HOOVER.

Division, The American Mining Congress*

Ira L. Wright

W. Mont Ferry

Henry L. Day

\+ + +

A REMEDY FOR THE HIGH COSTS OF COMPENSATION INSURANCE

The cost of compensation insurance may be reduced by active accident prevention, which is really the first step, and one that has been recognized by many employers.

Compensation acts should be so restricted that one interpretation only may be given. In many states the acts are so compiled that the board administering such acts are allowed to make decisions which are so broad in scope as to exceed the intentions of such measures. As a result, some employes abuse the protection afforded them by making a "racket" out of compensation. This is especially true in states where employes do not contribute to the compensation insurance fund.

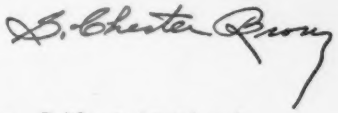
The allowance for partial and permanent disabilities, especially the latter, should be limited.

Overhead allowance should be reduced, especially in such states where competitive insurance is allowed. In some cases, the overhead is greater than the amount received by injured employes as compensation for injury. There should be no profit from the writing of compensation insurance policies.

Medical costs as a rule are excessive in certain types of injuries, and unlimited medical treatment as provided in a number of states should be eliminated.

The matter of occupational disease is very serious, and now it is beginning to be a problem which may wreck compensation acts in some states.

In states, where exclusive state funds do not exist, the cost of compensation insurance has been reduced by those having self-insurers permits. The cost of compensation insurance to those holding such permits is much less than to those who carry insurance.



Secretary, California Metal and
Mineral Producers' Association

\+ + +

F. C. van Deinse

Robt. E. Tally

* NOTE: *Photographs on these pages present a few of the members of the Board of Governors, Western Division. Complete Board unavailable.*

Julian D. Conover
Secretary, The American Mining Congress

(*Continued from page* 51)

NORTHEASTERN DISTRICT

Russell B. Paul (district chairman), Asst. Mgr. of Mines, The New Jersey Zinc Co.

Chester A. Fulton, Pres., Southern Phosphate Corp.

Lucien Eaton, Milton, Mass.

Arthur Notman, Mng. Engr. & Geol., New York, N. Y.

C. Merrill Chapin, Jr., V. P., St. Joseph Lead Co.

R. L. Hallett, Asst. Dir., National Lead Co.

Dr. H. Foster Bain, Hartsdale, N. Y.

PACIFIC NORTHWEST

R. M. Hardy (district chairman), Pres., Sunshine Mng. Co.

Dean Milnor Roberts, College of Mines, Univ. of Washington.

W. A. Castleton, Mgr., Alaska Sunset Mines, Inc.

Lewis P. Larsen, Pres., Pend Oreille Mines & Metals Co.

Harry Sordy, Secy.-Treas., Rocky Gulch Mng. Co.

Roy B. Earling, U. S. Smelting Refining & Mng. Co.

SOUTHEASTERN DISTRICT

H. A. Coy (district chairman), Supt. of Mines, American Zinc Co. of Tenn.

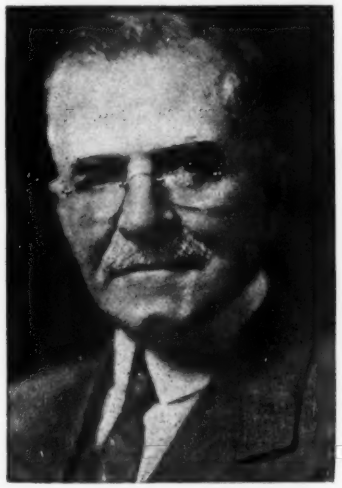
Floyd Weed, Universal Exploration Co.

F. H. Crockard, Met., Republic Steel Corp.

L. E. Geohegan, V. P. & G. M., Gulf States Steel Co.

Erskine Ramsay, Chr. of Bd., Alabama By-Products Corp.

J. N. Houser, Mgr., Tenn. Copper Co.



J. F. Callbreath
Secretary Emeritus, The American Mining Congress

Gilpin County, Colo., from the Air.

THE CONVENTION opens Monday morning, September 28, with Governor McDonald presiding. The opening will be preceded by an inspection of exhibits and with special efforts from the Welcoming Committee to see that things run smoothly. A luncheon will be tendered to James F. Callbreath, secretary emeritus of the American Mining Congress, at which Donald A. Callahan, president, Callahan Zinc-Lead Company, and a director of the organization, will preside. The American Mining Congress had its early origin in Colorado, and for many years its headquarters were maintained in Denver. Mr. Callbreath was its first secretary, and at one time was the president of the Denver Chamber of Commerce and leading lawyer of the state. Distinguished men throughout the industry will attend the luncheon.

TWO sessions of the convention will be held daily beginning Monday morning and ending Thursday afternoon. Friday and Saturday the convention will be continued by a series of trips being arranged by the Colorado committees, probably including visits to Cripple Creek, the plant of the Climax Molybdenum Co. at Climax, and the plant of the Colorado Fuel & Iron Co. at Pueblo.

THE LOCAL Committee on Arrangements is headed by the Honorable James Owen, well known Denver attorney, and President, Cripple Creek Mill Co. Members of the committee are:

John T. Barnett, Pres., Mountain Producers Corp.
Thomas A. Dines, Pres., United States National Bank.
Gerald Hughes.
Arthur Roeder, Pres., Colorado Fuel & Iron Corporation.
Russell P. Raynolds, Mgr., Colo. Dept., A. S. & R. Co.
Thomas B. Stearns, Pres., Stearns-Roger Mfg. Co.
Claude K. Boettcher.
Adolph F. Zang, Golden Cycle Corp.
J. O. A. Carper.

Mrs. Jesse F. McDonald is official hostess for the convention. A special Ladies Entertainment Committee has been appointed, which includes: Denver Section—Chairman, Mrs. Helen Campion Mulvihill; Mrs. John T. Barnett, Mrs. Verner Z. Reed, Mrs. D. R. C. Brown, Mrs. George E. Cranmer, Mrs. Owen E. LeFevre, Mrs. Thomas Patterson Campbell, Mrs. John M. O'Connor, and Mrs. A. E. Carlton. The Colorado Springs section of this committee, recently appointed, appears on page 58.

An Entertainment Section of the Local Committee is planning a series of entertainment features, which will include every day of the week. The entertainment and other special committees are as follows:

ENTERTAINMENT COMMITTEE—J. G. Clark, chairman, Gold, Silver & Tungsten, Inc.; C. O. Withrow; H. C. Bretschneider, Elkton Mng. Co.; V. C. Herrin, Red Arrow Mng. Co.; Harry D. MacDonald; Troy E. Wade, United Gold Mines; Alfred A. Holland, Ingersoll-Rand Co.; R. H. Summer, DuPont Powder Co.; O. H. Johnson, Mine & Smelter Co.; J. Q. Trompen; W. H. Bachman, Card Iron Works Co.; G. W. Gunderson, Gardner-Denver Co.; Walter G. Tripp, Hendrie & Bolthoff Co.; Thomas A. Dickson, Pres., Colorado Iron Works Co.; E. R. Wilfley, A. R. Wilfley & Sons; W. E. Scott, Jr., Russell Gulch Mng. Co.

ANNUAL DINNER—Henry S. Sanderson, chairman; Warren C. Prosser; Harvey L. Tedrow, G. M., London Mng. Co.

WELCOMING COMMITTEE—Fred C. Carstarphen, chairman.

LADIES' AUXILIARY, A.I.M.M.E.—Mrs. M. F. Coolbaugh, chairman.

DRILLING CONTEST COMMITTEE—J. Price Briscoe, chairman, Fairplay Gold Mines; E. P. Arthur, C. W. Lerchen, Alex McLellan, John Cortellini.

IN CONJUNCTION with the convention will be staged the Third Annual Metal Mining Exposition, which will present the equipment of the leading manufacturers of mining machinery and supplies. The exposition will be staged in the City Auditorium where the convention is to be held. About 15,000 square feet of space will be utilized, and about 75 companies will participate. A feature of the convention and of the exposition will be the Mineral States Exhibit, which will present much interesting data

+ + +

COMMON SENSE APPLIED TO INDUSTRIAL RELATIONS PROBLEMS

Mark Twain said, "Everybody complains about the weather but nobody does anything about it." This remark of the great humorist might be applied to industrial relations. Mining executives are practical men accustomed to accept the inevitable both in their battle with nature and in their other relations, and, without crying over spilt milk, to focus their efforts in the direction in which they can be effective. The most effective manner of avoiding difficulties in industrial relations is to clean one's own house.

As a matter of fact, many American executives, if not most, have in recent years been forehanded in applying constructive methods to their intra-plant problems. They have realized that their workmen are as important as their customers and that everything should be done to satisfy their reasonable aspirations.

I have always felt that the main thing that labor problems require is time and attention on the part of executives. Once the professional interest of executives is aroused in their labor problems they can be trusted to meet these problems in a constructive spirit.

Executives have come to realize that their responsibilities as assemblers and organizers of manpower are just as great as their responsibilities in mechanical and financial matters. For in every business plant there is, in addition to the economic side of industrial relations, a purely administrative problem.

It has been taken for granted that the only problem in the labor problem is the economic aspect but of course this is not so. There are very many administrative problems which are just as important in influencing the goodwill and cooperation of the worker as the economic problem. The point is that whereas the economic problem such as the matter of wages is not wholly within the control of the employer, the administrative element is.

If through the organization of a personnel department the worker is properly adjusted to his job, if he is given the opportunity for the redress of his grievances, when he has them or thinks he has them, for promotion when he shows his competency—in other words, for courteous attention to all his problems—there is very much less likelihood that he will yield to the blandishments of annoying troublemakers. Clean your own house, meet your own intra-plant problems—and you will have provided the best insurance against labor difficulties.

From one point of view, the factory is the melting pot of the nation. The adoption of right methods of conducting industry and tactful and effective supervision of employes will make the workers appreciate the importance of brains and leadership in our industrial structure. There is as much opportunity for statesmanship in the industrial field as there is in the political field.

Sam Lewisohn

Adolph Lewisohn and Sons.

+ + +

A. G. Mackenzie
Secretary, Utah Chapter, American Mining Congress

concerning the metal mining industry. States participating in this exhibit are Arizona, California, Texas, Colorado, Utah, Montana, Illinois, Alabama, Tennessee, Georgia, and Idaho. The data so presented will help materially towards a better understanding of the real importance of mining in this country. Dr. M. M. Leighton, Illinois Mineral Research Committee, is chairman of the exhibit.

Exhibitors presenting equipment for the attention of the delegates are:

Ahlberg Bearing Co.
Allen-Sherman-Hoff Co.
American Brattice Cloth Co.
American Sheet & Tin Plate Co.
American Steel & Wire Co.
Atlas Powder Co.
Bethlehem Steel Co.
C. S. Card Iron Works Co.
Carnegie-Illinois Steel Co.
Colorado Fuel & Iron Corp.
Colorado Iron Works Co.
Columbia Steel Co.
Crucible Steel Co. of America
Cuprinol, Inc.
Cyclone Fence Co.
Denver Equipment Co.
Denver Fire Clay Co.
The Dorr Co., Inc.
E. I. du Pont de Nemours & Co., Inc.
Thomas A. Edison, Inc.
Electric Railway Improvement Co.
Flexible Steel Lacing Co.
Gardner-Denver Co.
General Electric Co.
Goodman Manufacturing Co.
Great Western Electro-Chemical Co.
Harnischfeger Corp.
Hazard Wire Rope Co.
Hendrie & Bolthoff Mfg. & Supply Co.
Hercules Powder Co.
Hersey & Co.
Ingersoll-Rand Co.
Jeffrey Manufacturing Co.
Kansas City Structural Steel Co.
Kendrick Bellamy Co.
A. Leschen & Sons Rope Co.
Lorain Steel Co.
Mancha Storage Battery Locomotive Co.
Marion Steam Shovel Co.
McGraw-Hill Publishing Co.
McNally-Pittsburg Mfg. Co.
Mine & Smelter Supply Co.

\+ + +

ENTERTAINMENT COMMITTEE

J. G. Clark, Chairman, Gold, Silver & Tungsten, Inc.

C. O. Withrow
H. C. Bretschneider, Elkton Mng. Co.
V. C. Herrin, Red Arrow Mng. Co.
Harry D. MacDonald, Doctor, Jack Pot Mining Co.
Troy E. Wade, United Gold Mines
Alfred A. Holland, Ingersoll-Rand Co.
R. H. Summer, DuPont Powder Co.
O. H. Johnson, Mine & Smelter Co.
J. Q. Trompen
W. H. Bachman, Card Iron Works Co.
G. W. Gunderson, Gardner-Denver Co.
Walter G. Tripp, Hendrie & Bolthoff Co.
Thomas A. Dickson, Pres., Colorado Iron Works Co.
E. R. Wilfley, A. R. Wilfley & Sons
W. E. Scott, Jr., Russell Gulch Mng. Co.

ANNUAL DINNER

Henry S. Sanderson, Chairman

Warren C. Prosser
Harvey L. Tedrow, G. M., London Gold Mng. Co.

WELCOMING COMMITTEE

Fred C. Carstarphen, Chairman

LADIES COMMITTEE

Denver Section	Colorado Springs Section
Mrs. Helen Campion Mulvihill, Chairman	Mrs. A. E. Carlton, Chairman
Mrs. John T. Barnett	Mrs. Spencer Penrose
Mrs. Verner Z. Reed	Mrs. George M. Taylor
Mrs. D. R. C. Brown	Mrs. J. W. Ady
Mrs. Geo. E. Cranmer	Mrs. W. A. Otis
Mrs. Owen E. LeFevre	Mrs. L. G. Carlton
Mrs. Thos. Patterson Campbell	Mrs. E. S. Zell
Mrs. John M. O'Connor	Miss Matilda McAllister
Mrs. A. E. Carlton	Mrs. R. O. Giddings
	Mrs. Charles L. Tutt

DRILLING CONTEST COMMITTEE

J. Price Briscoe, Chairman, Fairplay Gold Mines

E. P. Arthur
C. W. Lerchen
Alex McLellan
John Cortellini

\+ + +

Robert S. Palmer

Secretary, Colorado Chapter, The American Mining Congress, who has taken an active part in the development of the convention

Mine Safety Appliances Co.
National Fuse & Powder Co.
National Lumber & Creosoting Co.
National Tube Co.
Ohio Brass Co.
Oliver United Filters, Inc.
Rocky Mountain Electrical Ass'n.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
St. Louis Power Shovel Co.
Stonehouse Signs Co.
Sullivan Machinery Co.
Tennessee Coal, Iron & Railroad Co.
Timken Roller Bearing Co.
U. S. Steel Corp.
Utility Mine Equipment Co.
Vulcan Iron Works Co.
Western Cartridge Co.
Westinghouse Electric & Mfg. Co.
Wood Preserving Corp.
Worthington Pump & Machinery Co.
Yale & Towne Mfg. Co.

The annual meeting of the Board of Governors of the Western Division will be held on Tuesday, September 30, when officers will be elected for the coming year, and the place of the annual meeting will be selected. Howard I. Young, president of the American Mining Congress, has called a meeting of the National Board of Directors to meet during the convention. The conferences on Mineral Taxation—Government and Industry—Mine Health Problems—and Necessity for United Action, will draw large attendance and create wide interest. The program is a roster of Who's Who in Metal Mining and fairly bristles with distinguished names. The topics to be presented throughout are timely, and undoubtedly the resolutions adopted will, as in the past, crystallize the best thought of the metal mining industries towards a constructive solution of national problems.

The combination of a distinguished program, presenting timely subjects by authorities; the exposition presenting the newest devices for cost-reduction and safety in metal production; the opportunity to see beautiful Colorado at its most beautiful period in company with fellow mining men, is something that cannot be easily overlooked or ignored. The opportunity is one that offers the maximum of enjoyment and reward.

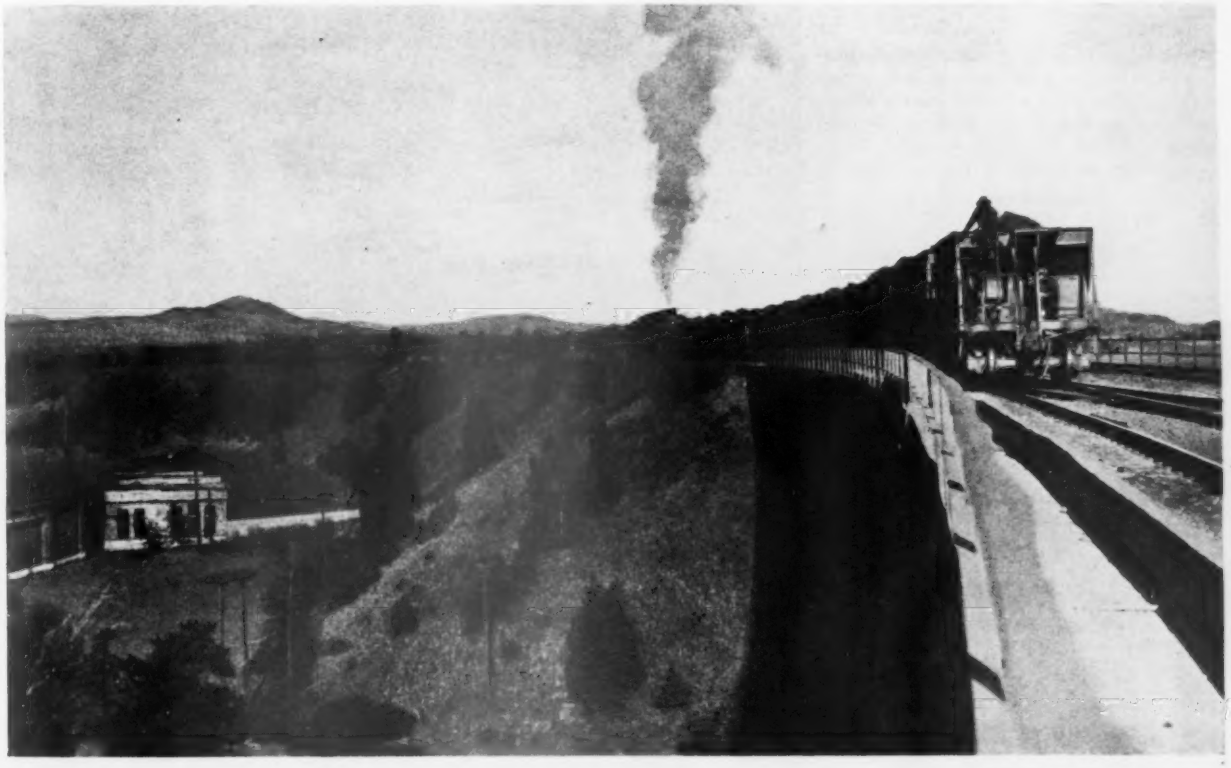
It is urged that the ladies attend the meeting. Everything will be done to insure their pleasure.

Much credit in the development of the meeting will go to Robert S. Palmer,

L. W. Shugg
Through the courtesy of the General Electric Company, will serve as director of exhibits

secretary, Colorado Chapter, The American Mining Congress, who has handled local and state cooperation.

This is one convention that metal mining men cannot afford to miss. A careful perusal of the complete program presented herewith will convince even the most skeptical that this is an unusual convention that warrants the complete cooperation of all of those interested in the future of the industry.



Of All Things . . .

In front of the U. S. Treasury a huge fountain sprinkles daily . . . reminder of how lavishly the money is sprinkled inside. . . . At the base grows a border of flowers. . . . The other day blossomed there in all their glory bright yellow sunflowers, a whole row of them. . . . Watchers saw them only one day. . . . The gardener cut them that evening. . . .

A movement is gaining strength to revive the old songs. . . . If the Townsend movement gains strength a song that is going to be mighty popular is "Everybody Works But Father." . . .

. . . The Treasury recently issued a new half dollar which carries the likeness of Phineas T. Barnum on it. . . . Wasn't he the chap who said something about a sucker being something or other. . . .

Well, now that our precious twelve billion dollars in gold is going to be safe from the British, the Germans, and the Japanese, the big problem left is to keep it safe from the Coughlins, the Lemkes, the Dr. Townsends, and the Gerald K. Smiths. . . .

Prosperity, it is said, is here. . . . Wonder why 2,000 people stormed a New York office, tearing each other's clothes off in an effort to be first in line to apply for a half dozen jobs paying from $1,200 to $1,800 a year. . . .

. . . Never before in the history of the world has a Nation spent as much money in as short a time. . . . After all, twenty billions is a lot of money. . . . In fact, there isn't that much actual money in the world. . . . But that didn't bother the Seventy-third and Seventy-fourth Congresses. . . . Maybe their membership was looking for a place in history. . . . They'll get it . . . from the taxpayers two generations hence. . . .

Six Governors radio-answered Landon's acceptance speech. . . . If that leads to a counter barrage from 12 Senators, Spain would be a nice quiet place in which to live. . . .

There was much ado in the newspapers when West Virginia's youthful Senator Holt read Aesop's Fables to an impatient Senate as part of a filibuster. . . . Funny no one ever thought of how appropriate the satire was. . . .

Our idea of a great politician and statesman is Vice President Jack Garner. . . . He hasn't made a speech yet, probably won't. . . . If he ran for President on that ticket it would be a landslide. . . .

One way to distinguish a liberal politician from a conservative is that the former is the chap who wants to spend the conservative's money. . . .

We wonder if Candidate Lemke really means what he says when he declares that no one will be evicted from his home if he becomes President. . . . Is Mr. Lemke going to build a new White House? . . .

One thing the youth of today won't have to wonder about is what he'll be when he grows up. . . . Obviously, he'll be a taxpayer. . . .

Two million dollars is being spent to air-condition the Capitol and the Senate and House office buildings. . . . The job will be finished in January . . . another example of Government efficiency. . . .

Secret service agents arrested a farmer for counterfeiting. . . . It looks like nobody will let the farmer make any money. . . .

Changing Trends in the Use of Steel

Interior of Steel Mill, Pittsburgh District

By WALTER H. VOSKUIL*

THE commanding position of iron and steel among the metals is a consequence not only of the comparatively low price of the metal but also because of its adaptation to a wide number of uses, each requiring a special combination of physical properties such as hardness and toughness, ductility, resistance to corrosion, etc. Diversity in the physical properties of steel is accomplished by varying the form and content of carbon or by adding one or more alloying metals in varying proportions and combinations. Complete substitution for other more costly metals cannot, of course, be achieved, such as obtaining the electrical conductivity of copper or the combined lightness and strength of aluminum alloys; nevertheless it is probably safe to say that the alloys of iron offer a greater range of adaptability to special uses than any other metal. Hence, the market outlet is large and the number of uses may be expected to expand in the future.

The outlet for steel, apart from the fluctuation of industrial productivity that occur from year to year, is subject to certain changes due to approaching industrial maturity in the United States with a consequent decline in demand for some uses and a potential rise in demand in others. For example, the virtual completion of the railroad system in this country is accompanied by a declining rate in demand for new rails while a growing automobile industry demands more steel.

Chart No. 1 shows the trend of steel production from 1920 to 1934. While the brief depression in 1921 marked a temporary recession from war time demand, and was followed by even greater output in the succeeding years up to 1929, the more severe and prolonged recession from 1930 to 1933 may mark a turning point in the steel industry which will be followed by a more moderate level of demand. The ratio of open hearth steel to total steel is slowly increasing and is expected to continue with the decline of the Bessemer process.

The future outlook for steel production must be evaluated from a study of trends of consumption of steel by major uses. These uses may be classified as follows: Railroad, automobiles, building construction, containers, exports, oil, water and gas machinery, and other uses.

* Mineral Economist, Illinois State Geological Survey.

Total railroad steel consumption has shown a severe decline from the high level of 1923 to 1933 with a slight upturn in 1934. (See Chart No. 2). It is interesting to note the trends in track construction. It appears that the railroads practically confined their expenditures to necessary repairs on the road bed and made no attempts to extend trackage or even maintain in operation the present trackages. The trend of railroad mileage which reached a peak in 1916, when 254,000 miles were in operation, has declined to less than 247,000 miles. The future market for steel in this aspect of the railroad industry will be confined almost entirely to replacements. The purchase of steel for steel trackwork fell from 200,000 tons in 1926 to 26,000 tons in 1933.

The downward trend of consumption of steel in railroad cars and locomotives is more pronounced than in the item of steel trackage. (See charts 3 and 4). A continuing decrease in car loadings since 1929 resulted in an accumulation of idle equipment so that extensive replacements were not necessary. For example, the *New York Times* index of car loadings fell from 112 in 1929 to 51 in 1932. Rolling stock in use was kept in repair by replacement parts from idle locomotives or idle cars. The result is that at the present time, the percentage of equipment unfit for service is unusually high and, with a constantly increasing number of car loadings, extensive repairs and new construction will eventually be needed. Nevertheless, a level of car loadings equal to 1929 is hardly to be anticipated. The movement of coal, for example, an important item in rail tonnage, has decreased considerably and, due to various factors too intricate to analyze here, is not likely to return. As a consequence, demand for railroad steel will probably be below the level of the late '20's.

Automobile steel has shown, with minor fluctuations, an upward trend in percentage of steel consumption. While the manufacture of automobiles declined sharply from a high level of 5,622,000 cars and trucks in 1929 to 1,431,000 cars and trucks in 1932, this industry was one of the first to recover, and for a

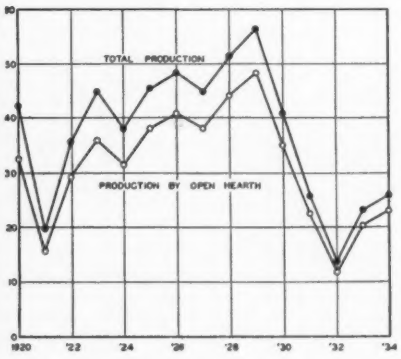


CHART I

Trend of steel production, 1920-1934, in millions of gross tons.

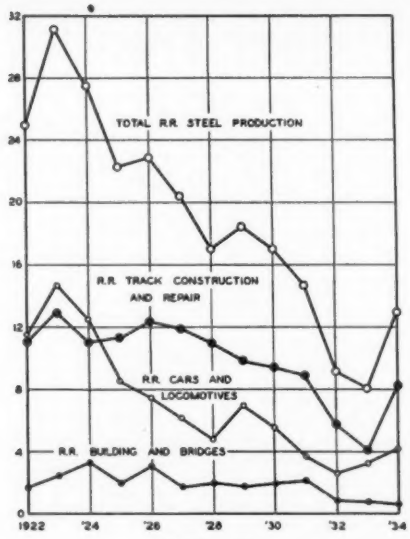


CHART II

Trend of consumption of steel by railroads, in percentages of total steel output.

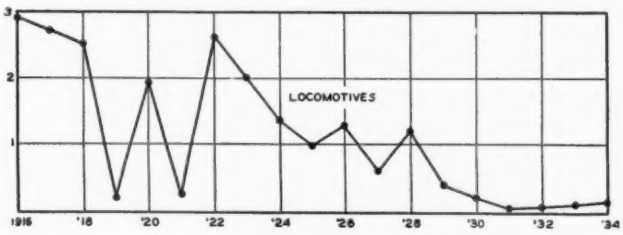


CHART III

Locomotives purchased, in thousands.

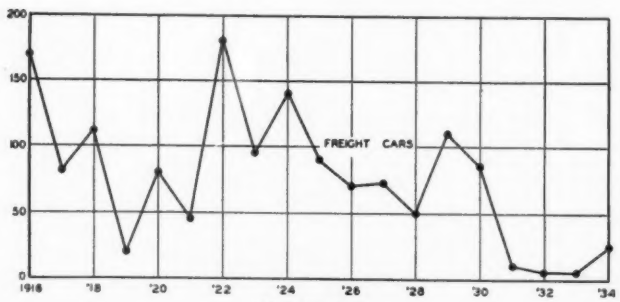


CHART IV

Railroad cars purchased, in thousands.

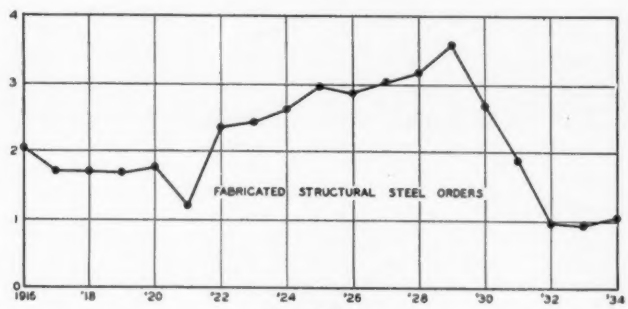


CHART V

Fabricated structural steel orders, in millions of tons of steel.

time, was the main support of the steel industry. Automobiles and allied products annually consume from 15 to 20 percent of the total steel output. The future trend of steel consumption by automobiles is likely to be fairly well sustained. There are now about 28,000,000 passenger cars, trucks and buses in operation in the United States. There was a rapid growth in numbers each year up to 1929, a recession during the depression, and a recovery in recent years. Production in 1935 was about 4,100,000 units and is expected to be about 4,600,000 units in 1936. Increase in the future may be rather small but the annual replacements will furnish a large business to the steel industry each year. Assuming an average life of 7 years per car, this means an annual replacement of 4,000,000 cars. In view of the years of low productivity, particularly in 1931, 1932, and 1933, there is probably an accumulated shortage of potential automobile demand considerably in excess of 4,000,000 cars.

Steel for Building Purposes. The building industry, as indicated by the value of building permits, rose rapidly out of the depression of 1921 and fell off sharply after 1928. This is reflected in the demand for fabricated structural steel during this period (see Chart 5). Since 1932 orders for structural steel have been at a low ebb. While a return to the high level of activity of the period 1925 to 1927 is not to be expected, there are signs that the building industry is reviving with activity in residential construction especially marked. An unknown element in the construction industry is the extent to which steel will be used in residential construction. The fabricated steel house has reached the experimental stage, but a considerable period must elapse before its feasibility can be demonstrated and extensive use can be expected.

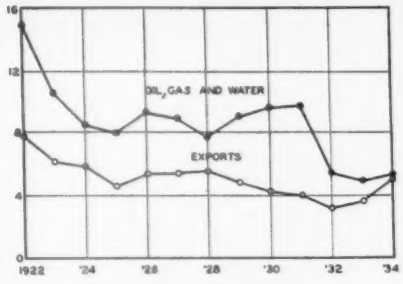


CHART VI

Steel for pipe manufacture and steel exports. In per cent of total steel output.

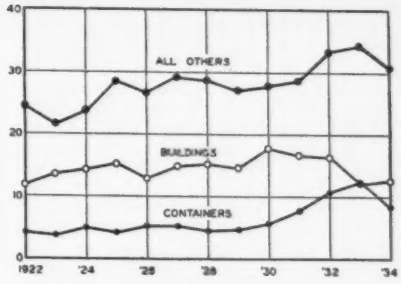
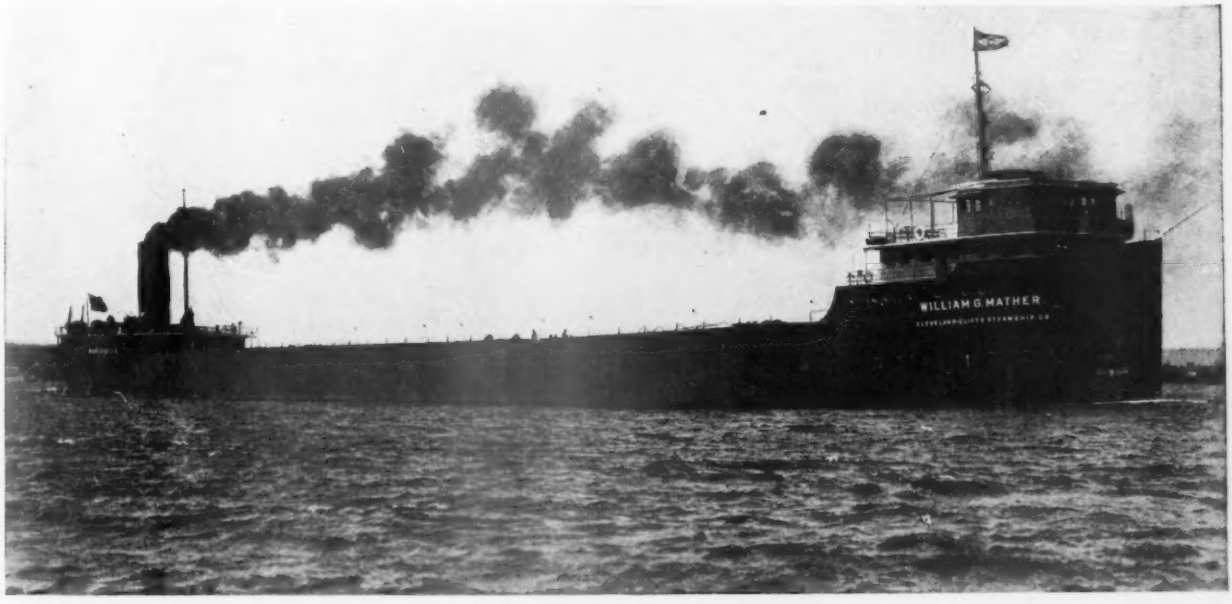


CHART VII

Consumption of steel in buildings, containers, and miscellaneous uses, in percentages of total steel output.

Consumption of steel in the water, oil and gas industries declined sharply since 1931 (see Chart 6). The largest tonnage used in this particular group of industries goes into long distance pipe lines with a smaller outlet for gathering lines and well casing. The major pipe lines for both oil and gas have probably been constructed; any further activity will be confined to extensions or short connections. Steel for gathering lines and oil well casings will show an increased demand over the low of 1932 and 1933 and promises to be well sustained in the future. Drilling activity in the oil fields has increased substantially since 1932. The difficulty of finding annually a new supply of oil equivalent to a year's consumption has been especially noticeable since 1930 and an intensive exploration and drilling program is needed to maintain current oil needs.

One item of steel use that is of particular interest is that shown in Chart No. 7 under "All Others." This represents steel used in the manufacture of articles other than the main classes, i.e., railroad, buildings, automobiles, oil, gas, and water containers, and agricultural implements. This outlet for steel has shown a rather consistent increase and in 1933 reached 34 percent. A surprisingly large number of small articles are made from steel which, in the aggregate, bulk large in tonnage. Steel wire, for example, in various shapes and sizes, is used in the fabrication of a wide variety of goods, and is constantly finding new uses. The steel producers are aware of the fact that future opportunities in steels lie in commodities which have hitherto been made from wood or from the nonferrous metals. The manufacture of alloy steels of various kinds, which give this material the properties of rustlessness, unusual hardness or toughness, etc., together with a lower cost per pound than other metals, has opened up opportunities for the development of new uses for steel. It is quite probable that this will form an important element in the steel industry of the future, and may have a stabilizing effect in the annual demand for steel.



Transporting Iron Ore, Duluth-Cleveland.

Haulage and Hoisting Practice
MIAMI COPPER COMPANY

By R. W. HUGHES*

HAULAGE and hoisting practice at the Miami Copper Company's mine, located at Miami, Ariz., have been developed to handle 18,000 tons each 24 hours from a low grade orebody originally estimated to contain in excess of 108 million tons.

An undercut, caving system of mining is employed by which the broken ore from the stopes is delivered by gravity into ore passes or transfer raises. Control of ore from these raises into mine cars is accomplished with hand operated, arc type control gates installed in pony sets above the haulage drift timber. Chute openings are 30 in. in width by 24 in. in height and deliver material which has been previously screened through 12-in. grizzlies on the level above.

Under normal operating conditions, potential ore storage in transfer raises servicing operating stopes, amounts to approximately 3,600 tons. Benefits derived from this storage are numerous. Delays originating in hoisting or hauling operations are not felt by crews on ore extraction in the stopes, while ore extraction delays in the stopes do not delay haulage. Choked raises offer no serious delays as they can be freed while loading is continued at other chutes.

* Mine Superintendent.

Tandem Arrangement of Baldwin-Westinghouse Six-Ton Motors.

Motive Equipment

Motors for trains on strictly ore service are Baldwin-Westinghouse, trolley type, six-ton mine locomotives, each equipped with two 250-volt ball bearing motors with automatic-contactor control. Motor frames are of bar steel, outside of wheel, with semi-elliptical leaf springs. Wheels are steel tired with a wheel base of 48 in. and wheel gauge of 24 in. Height, excluding trolley, is 48 in.; width overall, 46 in.; length overall is 12 ft., including bumpers. Rated draw bar pull is 3,000 lb. and rated speed is 6½ miles per hour. Trolley pole sockets are set in the center of locomotive and poles are reversible and equipped with adjustable head and wheel.

Cage limitations prevent the use of a larger motor, so that in ore service, motors are operated in tandem, control of both motors being had from the lead motor. In switching and supply service, they are used as single motors, the change over being a simple operation.

Six tandem combinations of Baldwin-Westinghouse locomotives, on each of three shifts, ordinarily handle the normal production of 18,000 tons each 24 hours. The remaining six individual motors of the same type are used for standby service, allowing a daily greasing and inspection of all motors. This inspection is made underground in a concreted repair shop equipped with an inspection pit. Major repairs are done on surface.

In addition to the 18 Baldwin-Westinghouse motors, there are eight Goodman motors equipped for single operation only. These are used in the service of supplies, for switching, and for gathering waste and ore derived from development work.

For surface work and for use on levels not equipped with trolley, six Jeffrey and five Mancha storage battery motors are in use.

D. C. power for trolley motor use is supplied by motor-generator sets, three in number, with a capacity of 125 kw. each, operating at 250 volts, located on surface and delivering underground through a 635-ft. vertical, churn drill hole, 8 in. in diameter and cased. Two single conductor, stranded copper cables, rubber insulated, each with 1,250,000

C. M. capacity, are strung through the churn drill hole for feed lines while the ground return, which is also carried through the hole, consists of three bare, stranded, hard drawn copper cables with 1,000,000 C. M. capacity each.

Underground distribution is had with No. 0000 figure 8 trolley in main haulage lines and No. 00 figure 8 in chute loading lines. Trolley is carried 7 ft. 6 in. above ties, and unguarded except at loading chutes. A bare, stranded feeder line, 400,000 C. M. capacity, is carried 4 in. above and directly over the No. 0000 trolley in main haulage lines. Current is fed from the feeder line to trolley by means of the hanger clamps.

Haulage Track

Rail used is 45-lb. with the exception of approximately 1,200 ft. of 70-lb. rail which has been installed at the point of heaviest duty. It is of interest that the 45-lb. rail previously installed in this section of heavy traffic had a life of approximately one year, or 6,000,000 tons hauled, whereas the change to the heavier section has resulted in an excess of 12,000,000 tons hauled since the change, and still considerable additional service in sight.

Ties under 45-lb. rail are 4 in. x 8 in. x 42 in., and under 70-lb. rail are 6 in. x 8 in. x 42 in. Ties are treated with zinc chloride solution and are spaced 20 in. Tie plates are used in all main haulage lines. Slightly over 5 miles of such track is in use on the present 720 haulage level, with a like amount proposed on the partially developed lower haulage level.

A hard diabase, crushed and screened, is used as ballast between ties and for 3 in. under them. All drainage water is carried in pipe lines laid below the bottom of ties, with open tees left at intervals of from 50 to 150 ft. to catch local seepage.

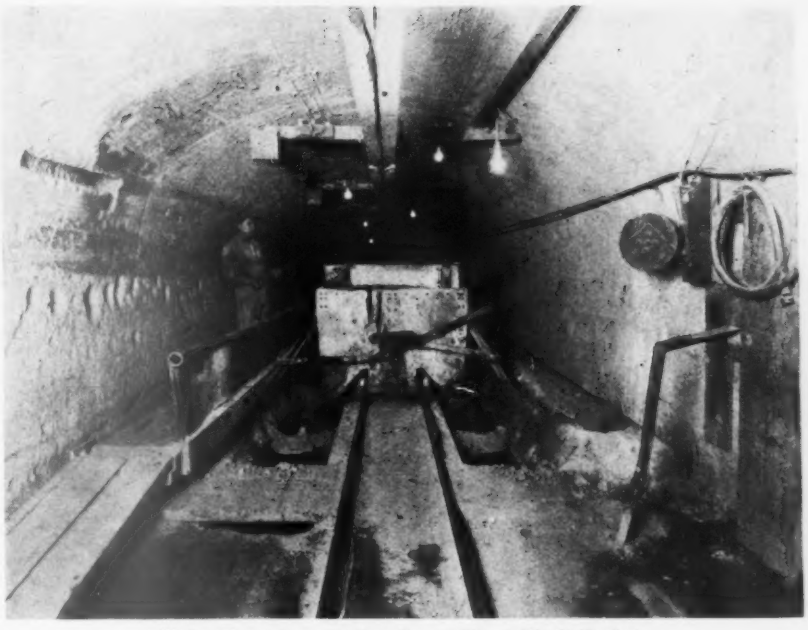
Switches are spring, ground throw, and frogs are cast manganese. Track grade is carried four-tenths of 1 percent, and a curve radius of 41 ft. 3 in. has been selected as best adapted for equipment.

Bonds are No. 0000 flexible, stranded, and are arc welded to rail base.

Cars

Ore is hauled in 86 cu. ft. capacity, gable-bottomed, side dump cars. Empty cars weigh 2½ tons and carry a pay load of approximately 4 tons. Dumping and locking is done by means of one lever operating both doors. Levers are hand tripped by one train helper and locked by the other helper while the train is moving at 2 miles an hour over the pocket.

Couplings are link and pin, working in a spring cushioned draw head, giving a car center of 8 ft. 10 in. when extended, and 8 ft. 2 in. when compressed. The car frame is spring cushioned on the bearing boxes, which are Timken equipped. All car repairs are done in the surface machine shop, although a thorough car inspection is made under ground twice a month, with each car lifted from the track over an inspection pit. Greasing is done underground once in 60 days.



Unloading 86-cu.-ft. Ore Car at No. 5 Shaft Pocket.

An analysis of delays to transportation due to derailments showed that poor track and bad order cars were approximately equally contributive. It also developed that the average time lost from derailment was 20 minutes, including all causes for both motors and cars. Reduced to tonnage this resulted in losses running from 50 tons to 300 tons, depending on whether or not the train involved was followed by other trains outward bound. One of the leading causes of derailment was spill in loading. To aid rerailment, rerailing frogs are installed on the outgoing side of a series of chutes servicing each stope. Similar frogs are placed at the junction of loading lines with main haulage lines and at the pocket where derailments from dumping occur.

Handling Spilled Material

The gable-bottom cars in use have the advantage of a low center of gravity, and fast unloading, but have the disadvantage of spilling fine material at the bottom seal. This is especially true in the case of returning empty cars which discharge fines remaining after dumping. This material, combined with spill from loading, amounts to about one-tenth of 1 percent of the tonnage handled and presents a problem in itself. This is not because of the 18 to 20 tons involved, but because of the interference to haulage operations in its reclaiming. It has developed that it is best handled by a regular crew, consisting of a motorman with helpers, who make the rounds of loading lines while ore trains are diverted and shovel directly into cars spotted at convenient intervals. It is no more expensive to keep the track cleaned down to the top of ties than it is to allow it to pile up to a derailing height. In this latter condition it becomes so compacted that it must be loosened with a pick.

Train Operation

Excluding lunch times and time consumed in changing shifts, an effective hauling time of 20 hours is had in each 24 hours, or at the rate of 900 tons an hour. Storage capacity available at the hoisting shaft is but 700 tons. Production is maintained with 6 trains of 35 cars each, servicing stopes on each of the 3 shifts. In addition, there is one shorter train on each shift which handles development material. Excluding ore derived from development, which is normally but 5 percent of total tonnage,

86-cu.-ft. Ore Car Under Loading Chutes.

the 6 trains on ore service average a round trip of 1.92 miles each 58 minutes, 53 percent of this time being spent in loading, and 47 percent being consumed in unloading and in transit. Individual trains on short runs servicing stopes with fast loading ore will maintain a round trip speed of 40 minutes, of which 35 percent is spent in loading, and 65 percent in unloading and in transit.

Train crews consist of a motorman with a front and a rear helper. In loading, one helper operates the steel arc gate in the pony set above the haulage level, while the other stands in the drift below and signals the motorman in spotting cars. He also takes a grab sample from each car loaded. When loaded, the motorman accompanied by one helper, proceeds to the pocket where they are assisted in unloading by the pocket man. The other train helper remains in the line where he is occupied in cleaning track or freeing hung raises until the return of the empty train.

Because of the 8-in. differential in car centers, depending on whether or not the link and pin couplings are extended or compressed, all loading is done by backing the train up grade, the rear car being first loaded. Cars are filled with one spotting.

Contact is made with each motorman, each trip, through a train dispatcher whose station is located on the return line. This dispatcher issues written orders designating the rotation of raises to be drawn, based on information coming to him by telephone from the stope bosses on ore production.

Handling Sticky Ore

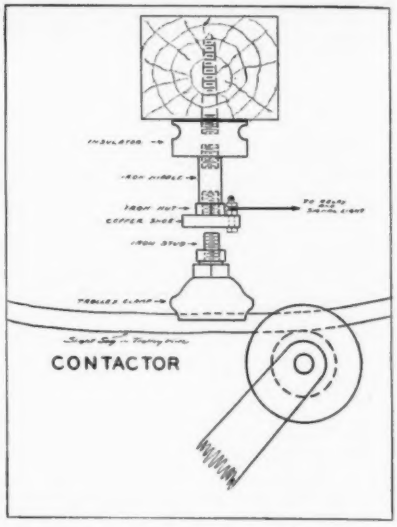
Normal moisture content of Miami ore is 3.5 percent. When material does not carry too high a percentage of fines there is no difficulty in moving this through the 55 degree ore passes. When the percentage of fines is high, or when average sized material carries a high moisture content, trouble starts if the ore is allowed to come to rest in the raises. Various schemes have been tried to overcome this, such as hanging loose chains in the raise corners; flat sheets on the raise bottoms; perforated pipes discharging air in the raise corners, and blow pipes at the bottom of the ore column. Best results are obtained by running the ore directly from the stopes into the cars, the arc gates for control being closed but long enough to allow the spotting of an empty car. A steady flow of ore is insured by telephonic communication between top and bottom of the 100-ft. inclined raises. Telephone wires for this service are strung through the raise, being protected by 1-in. pipe laid in the bottom corner. The whole arrangement is protected by the accumulation of fines.

Signal Systems

Train movements, outside of backing up while loading, are in a forward direction at all times. This is accomplished by means of a 180-degree curve in the return track, after trains are dumped. Returning empty cars are routed to the west fringe of the orebody from which they are diverted to their individual loading lines. After loading, they again join traffic at the east fringe of the orebody.

Movements onto and across main lines are controlled by hand-operated electric signals acting through relay switches. Selection of hand-operated signals for this service was based on the assumption that right of way is not sufficient evidence to clear a train crew's responsibility for a wreck. Hand signals are not set until the helper has had visual assurance that his proposed movement is safe, and further insurance is had in requiring the motorman to come to a complete stop before his helper gets off to set the signal.

Traffic on main lines, along which trains are moved by the block system, is controlled automatically by trolley wheel operation. Signals are set ahead of the motor by the trolley wheel's upward pressure raising the trolley wire slightly,



Contactor for Trolley-Operated Signal System.

thus making contact with a relay switch. The block is cleared behind the train by the trolley wheel flanges slightly raising a second switch, thus breaking the circuit which it normally makes with the trolley.

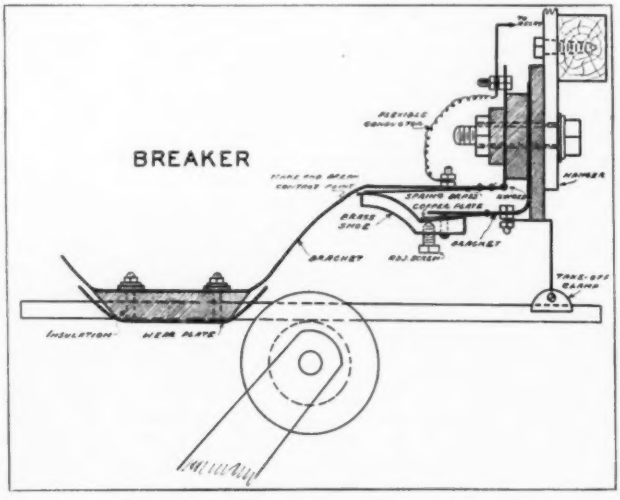
Signalling from helper to motorman is complicated by the lengths of trains, which exceed 330 ft. when extended. This is further complicated when loading on curves. The previous signals of police whistles and hand lamps have been replaced with electric pull switches, located at loading chutes, which simultaneously light a series of 250-volt lights spaced along the loading lines.

Edison storage battery trip lamps with red lenses are attached to the rear car of each train.

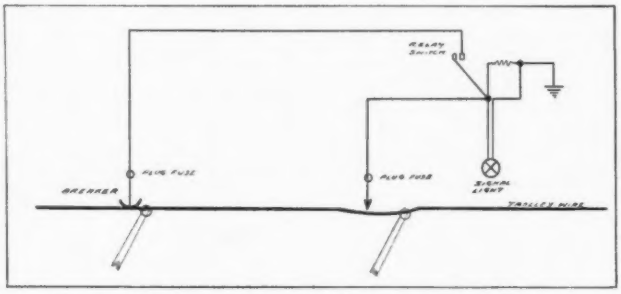
Of all mine operations, ore haulage is considered the most potent with accident possibilities. This is due to the severity rather than the frequency of such accidents. Under normal operations, Mexican labor is employed. Young, active and alert men are desirable for this service, but men who have these qualities, sometimes border on the dare-devil type. Constant surveillance is necessary in spite of signal systems and other devices.

Skip Loading

Ore is delivered from the haulage level pocket to the skips in approximately 10-ton units through a measuring cartridge. A knife type cut off door, piston driven and air actuated, is withdrawn from the ore column in the discharge opening at the bot-



Breakers for Trolley-Operated Signal System.

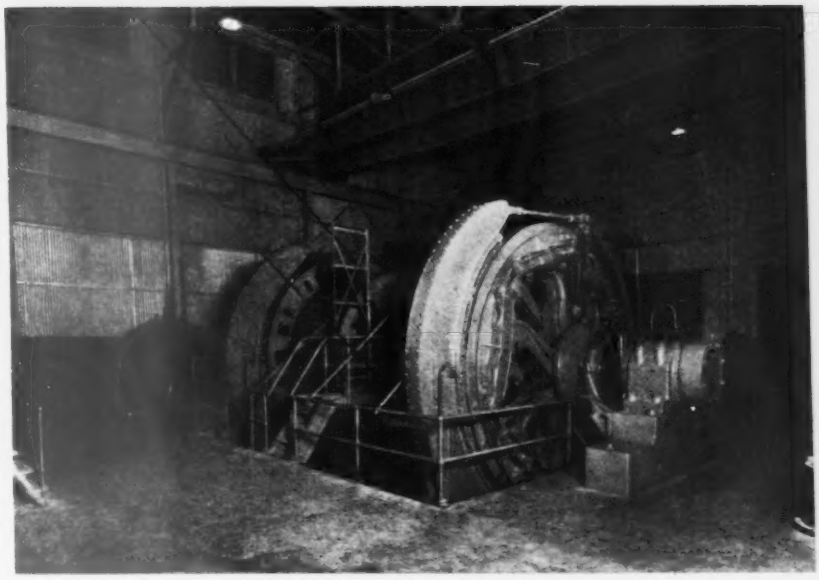


Wiring Diagram for Trolley-Operated Signal System.

tom of the pocket. When the cartridge has received its load, which is equal to that of the capacity of the skip, the ore attains its angle of repose and is stopped. The cut off door is then forced back up through the ore. Flow of ore from the measuring cartridge is controlled by an arc type gate, which is also air operated. The operation of discharging the contents of the measuring cartridge into the skip consumes 3 seconds.

Shaft chairs are not used in loading skips, and a rope stretch of 18 in. results from the loading operation. Spillage amounts to approximately the same as in haulage; one-tenth of 1 percent of tonnage handled, or 20 lb. for each skip loaded. Spillage falls down the shaft and is reclaimed by a chute across the shaft slightly below the bottom of the skip. This chute delivers into cars, which, when loaded, are hoisted on the cage and dumped into the haulage level pocket.

A loaded skip is delivered to the crushing bin, 811 ft. above, each 38½ seconds. Starting of the hoist is done by the skip tender with push-button control. He can also stop the hoist in an emergency by similar control. When the surface bin is full, he is notified through an automatic signal placed before him. All operations of filling the measuring cartridge, filling the skip and starting the hoist, are controlled from a point which allows a view of the skip being loaded.



Nordberg Ore Hoist, No. 5 Shaft.

Skips and Guides

Skip boxes are 4 ft. 7¼ in. x 4 ft. 7¼ in. x 10 ft., inside. Weight of empty skip is 8 tons.

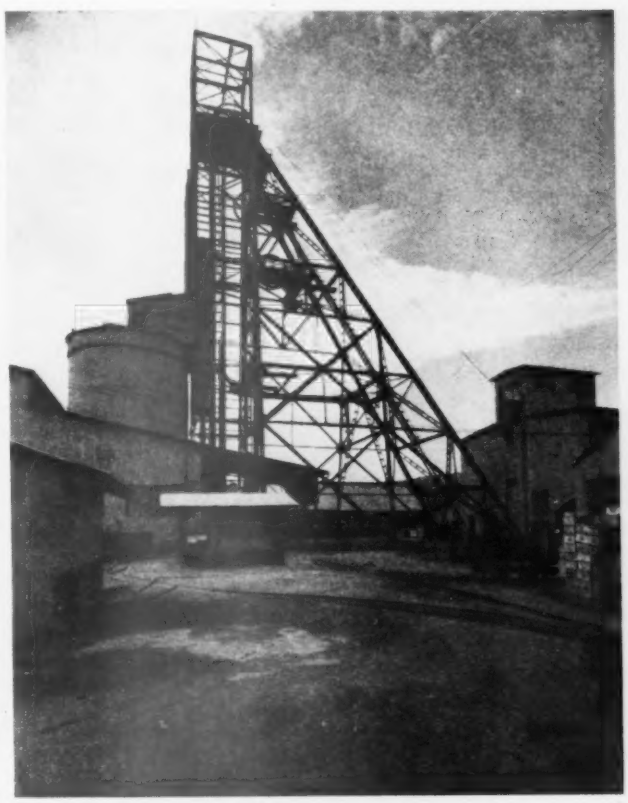
Each of the skip compartments occupy 5 ft. 6 in. x 6 ft. 2 in., of a reinforced concrete lined shaft which is 16 ft. 4 in. x 13 ft., in the clear. Skip compartments are separated from each other and from the adjoining cage compartment by 8-in. reinforced concrete curtain walls.

Wooden guides, 5½ in. x 7½ in., placed 5 ft. 3 in., face to face, are secured with ¾-in. bolts at 5-ft. intervals. When originally installed, guide fastenings consisted of angle irons set in the concrete walls. These were difficult align and required reboring after placement. They were easily loosened from side movement and have been replaced with 3-in. x ½-in. x 36-in. iron straps which are held in place to the shaft walls with anchor bolts.

Selected Oregon fir guides give approximately five million tons service, discard being from excessive wear. The lines of guides are set from plumb lines, but uneven wear from cable twist has never been entirely eliminated. An attempt has been made to compensate for this twist by alternating from right lay to left lay lang ropes, but this was found to be ineffectual. The present installation of a "Tru-Lay" rope gives indications of helping this condition.

Hoisting Ropes

Skip ropes are 1¾ in., 6 x 19, hemp center, lang lay, and give a service of between 1½-million and 1¾-million tons. Fastening is made at the skips by means of clamps and thimble of 7½-in. radius. Socket fastening was tried and discarded. Wire breakage at the socket rim was excessive, apparently due to the combination of fast acceleration, high speed, and short lift, setting up excessive vibrational stresses which were damped at the socket. Ropes are cut back at the skip end, between four and six times during the life of the rope. Rope practice has been conservative, changes being based on four broken wires in one lay. Ropes have exceeded 1½ million tons service with no broken wires. Lubrication conditions are good, due to the combination of down cast air and very little seepage.



Head Frame, No. 5 Shaft.

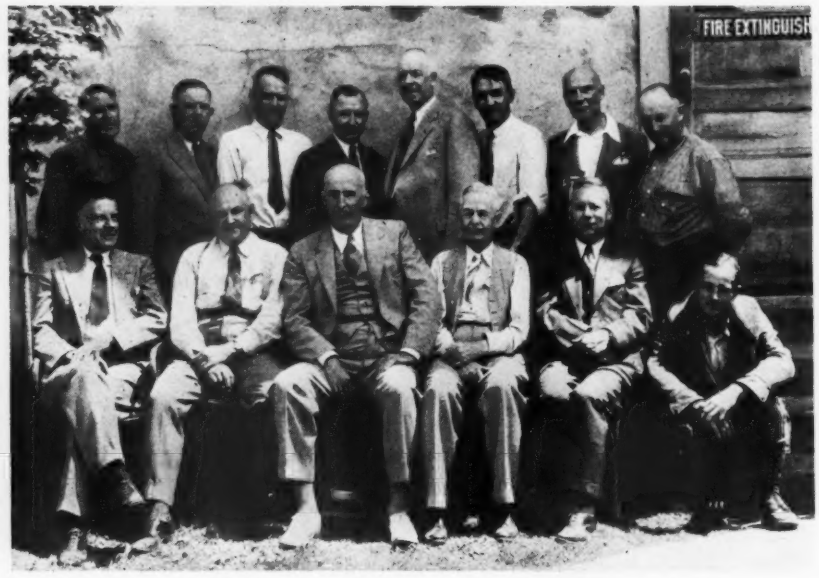
Sheaves

Sheaves have a 12-ft. groove diameter and are of the skeleton type. Arms are 3½-in. T-bar section welded to hub and base ring. Removable, hot-rolled steel liners, made up in 12 sections, are held in place with bolts through the arms. Groove diameter is carefully watched and brought to gauge by turning down in place on the headframe. Several such regaugings are possible before liners are changed.

Headframe

The headframe is of steel construction throughout, and is 149 ft. 6 in. from base line to top of the sheave handling structure. The vertical distance from center line of sheave to center line of hoist

(*Continued on page* 76)



Mr. Easton, and Members, Operating Staff.

Waste Filling in the Bunker Hill Mine

By S. W. McDOUGALL* and U. E. BROWN*

IN DISCUSSING Waste Filling of Stopes at the Bunker Hill and Sullivan mine at Kellogg, Idaho, an understanding of the development of the methods of stoping is necessary. This is covered more or less completely in "Bureau of Mines Information Circular 6407."

The orebodies are wide irregular masses of galena with siderite and quartz gangue. Stopes may be 1,000 ft. long and vary in width from 10 ft. to 125 ft. There is ordinarily one fairly well defined wall, but never two. The dip is from 40 degrees to 50 degrees. These orebodies occur in a zone of sheared and faulted quartzite of Algonkian age.

In mining these wide orebodies it was soon found that square sets alone would not support the heavy rock of the vein and the broken hanging wall rock. Early methods of filling consisted of sorting waste from the ore when it was broken and allowing the hanging wall rock to cave. This was unsatisfactory as sorting seldom furnished enough filling and the caving of the hanging wall was impossible to control. Ore would cave with the waste rock and be lost. Distribution was difficult in the wide flat stopes and the heavy vein material was still unsupported. Waste

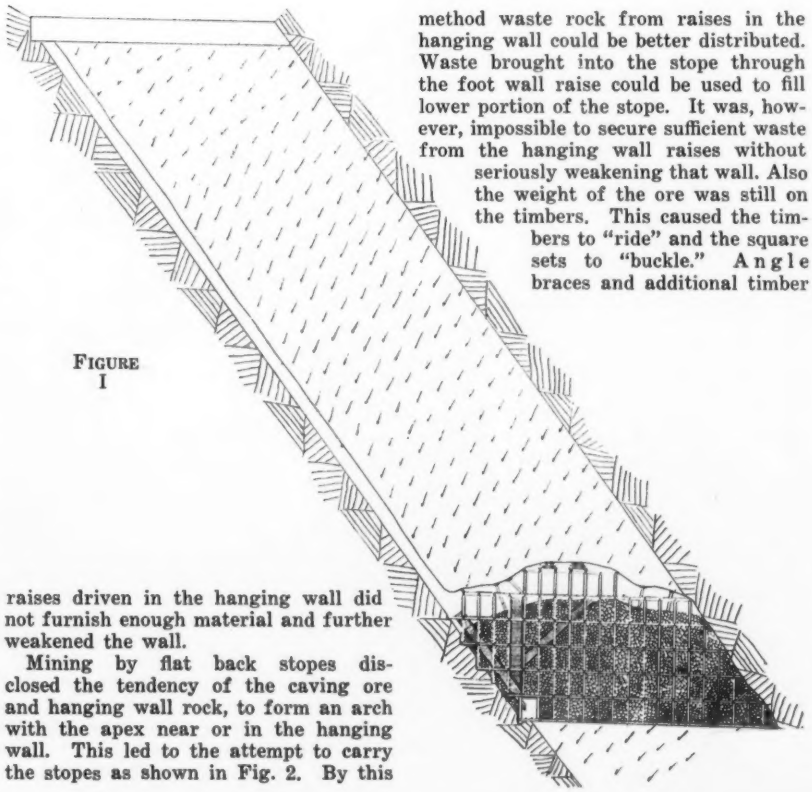


FIGURE I

raises driven in the hanging wall did not furnish enough material and further weakened the wall.

Mining by flat back stopes disclosed the tendency of the caving ore and hanging wall rock, to form an arch with the apex near or in the hanging wall. This led to the attempt to carry the stopes as shown in Fig. 2. By this method waste rock from raises in the hanging wall could be better distributed. Waste brought into the stope through the foot wall raise could be used to fill lower portion of the stope. It was, however, impossible to secure sufficient waste from the hanging wall raises without seriously weakening that wall. Also the weight of the ore was still on the timbers. This caused the timbers to "ride" and the square sets to "buckle." Angle braces and additional timber

* Bunker Hill and Sullivan Mining & Concentrating Co.

would not support the weight of the ore which rested on the timber. In spite of all efforts the timber would collapse and caves occur with loss of ore and interruptions of operations.

Attempts to remedy these conditions led to the evolution of the present system of stoping. Fig. 3 shows an ideal section through a wide square set stope. The high sharp arch, almost vertical working face, with the stoped space filled tightly within one or two sets from the face, allows the weight of the ore to rest on the footwall and the weight of the hanging wall to be carried on the filled square sets. The figure shows the footwall raise through which waste is brought to the stope and the gangway connecting the raise with the stope and through which the filling material is distributed. When a new floor is opened in the stope a new gangway is driven from it to the raise. Each of these systems demonstrated that timber alone would not keep a stope open. The system, as illustrated in Fig. 3, has demonstrated that by maintaining a vertical working face and closely filling the space from which ore has been removed stopes can be kept open and the ore extracted with a minimum of loss. Ventilation is facilitated and danger from falling rock largely eliminated.

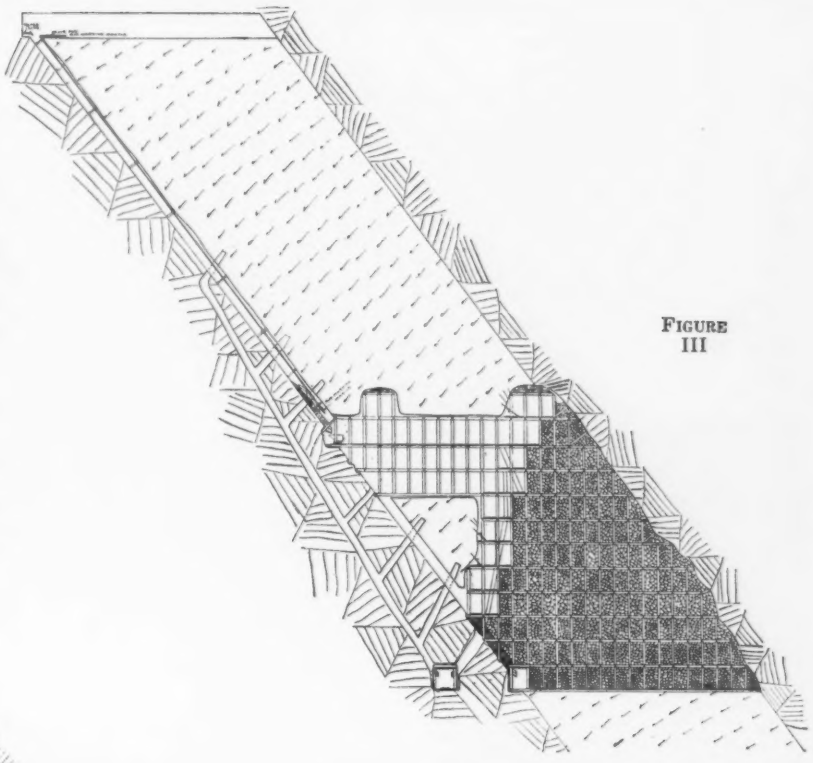


FIGURE III

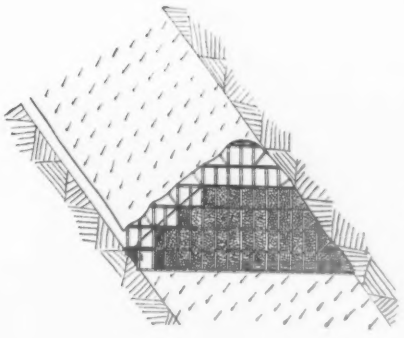


FIGURE II

It has been estimated that by making use of such waste as is sorted from the broken ore, certain amounts of vein material of too low grade to be commercial

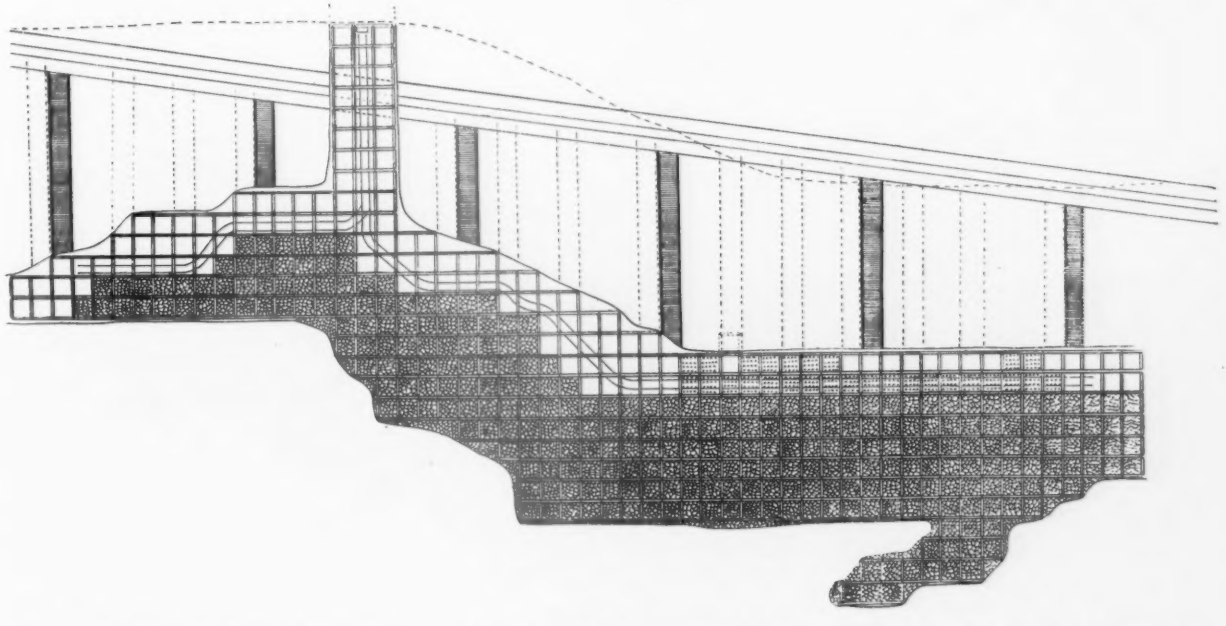


FIGURE IV. *Plan of stope showing square sets filled from the hanging wall to near the face. Also shows sections of the stope filled against the face to support blocks of heavy ground. Track for distribution shown on the top floor.*

ore and the space occupied by the timber that a volume of broken waste rock equal to one third the volume of broken ore removed will keep a stope filled. This is purely an arbitrary figure and is derived from the average grade and character of the vein material and the volume of timber used.

When a section of the stope has advanced a sufficient distance, usually not more than two sets from the hanging wall or space already filled, the sets are lagged up with slabs. This section of the stope is of no arbitrary dimensions. It may be of any length and generally extends from the foot wall to the top floor of the stope where is located the distributing tracks. Fig. 4.

When a stope is being filled the material enters the stope through the foot wall raise. Fig. 3. It is then loaded through a chute into small cars and hand trammed to the section being filled; the usual procedure is to keep a supply in the foot wall raise. Fig. 3.

In the section of the mine below the Kellogg tunnel, a continuous waste pass connects all levels. Material can be put in or withdrawn from this pass on any level.

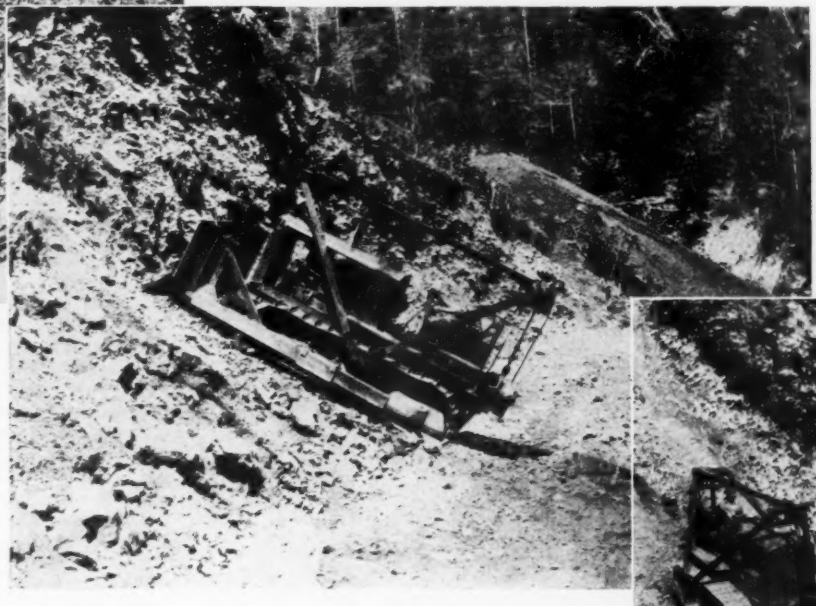
Several sources and methods of procurement of waste rock are made use of as occasion demands. A small amount of waste is hand sorted from the broken ore. This sorting is done in the stopes and no transportation is necessary. While this is a constant supply, the quantity is small and entirely inadequate.

At times a stope is so situated that it is necessary to fill it by mining waste. This is, of course, done in the hanging wall. Two methods are used. Either the waste is mined and the ground timbered as is the vein or an untimbered waste stope is carried in the hanging wall. In the latter case the material is moved into the main stope by drag scrapers. Hanging wall raises are used when necessary. These methods have the advantage of little transportation but are otherwise not desirable if waste can be supplied from outside the stope. The mining and timbering of barren areas in the hanging wall of a stope adds to the space that must be filled. All of these methods weaken the hanging wall which is not stable at any time.

At times raises have been driven on faults at some distance from the orebodies. The raises are caused to cave. Considerable rock has been obtained in this way. This method is subject to the same criticism as other waste raise, i.e., too much drilling and blasting for the amount of waste obtained.

The cheapest and best method of obtaining waste is to utilize rock from development work. This material as it is broken makes excellent filling, is easy to handle and in any case must be moved. Development work, however, does not always furnish sufficient material and is not always so located that the waste can be used where most needed.

During the last three years, large new stopes have been opened above the Kellogg tunnel level. As development and exploratory work in this area had long since been largely completed, this source of filling material was not available. It became necessary to develop other sources. To do this a raise containing a chute and skipway was extended 320 ft. to the surface. A grizzly of heavy steel rails was built over the raise. One bench was leveled off with a drag scraper. An RD 6 Diesel caterpillar Angledozer was placed in service on this bench. This powerful machine is used to loosen the rock and push it onto the grizzly. The raise through which this material enters the mine, came to the surface on the side of a small gulch where the overburden is a heavy mass of broken rock debris deposited by freshets and probably old slides. Most of the material is of proper size to pass the grizzly, occasionally boulders must be broken with a hammer. Boulders too large are easily cast aside by the Dozer. This surface work will furnish waste for an indefinite period without recourse to blasting. Even by amortizing the cost of the machine to the first 10,000 tons of rock the cost of this method per ton of rock is less than any other method of procurement except waste rock from development work.



Views of Angledozer in Operation.

Copper Alloys In Industry

By BERTRAM B. CADDLE*

THE so-called lost art of hardening copper by the ancient Egyptians is a myth that has prevailed among many peoples of the world for generations. It is the oldest metal of commerce and was first found by a half-savage tribe that inhabited the Island of Cyprus. The metal was useful and became their most choice possession. They named it "Cyperian metal," in honor of their homeland. Our tongues changed it to copper.

Long after the discovery of copper and the ability of man to make fire, the hordes came out of India and settled on the banks of the Euphrates and the Nile, to establish the first known civilization. These ancients learned the art of alloying copper to make bronze. Archaeologists credit the Bronze Age as the first stepping stone to the advancement of the human race.

The Egyptians found that when copper was alloyed with tin or zinc it could be shaped and hardened by hammering with stone implements. This was the origin of the long line of bronzes and brasses extending on down through the centuries to the present day. In the early part of the Bronze Age the Egyptians used the metal to fashion ornaments, implements, and utensils for both war time and peace time. During recent years archaeologists have unearthed ancient cities and the tombs of the Pharaohs and found many articles made and used by the early civilizations. Those of bronze left the history of the use of that metal centuries ago. The objects unearthed were for the most part in an almost perfect state of preservation and gave evidence, without the necessity of a written language or hieroglyphics, of the use of the metal.

It was from the discovery of these bronze objects, showing that the Egyptians knew how to harden copper, that the fallacy of the lost art of working the metal sprang into existence and has prevailed in all quarters of the globe. Since the formation of our association 14 years ago, we have, at frequent intervals, received letters from persons in many lands, and also personal calls, informing us that the lost art of hardening copper has been discovered. Many submit samples and all, as a rule, want to sell us the formula.

The fact of the matter is that present-day metallurgists not only understand how the ancients hardened their copper and bronze but also know how to produce copper and bronze products that are by far harder than those of the ancient Egyptians. But despite this fact, well known in our industry, every once in a while articles appear in newspapers and magazines that the lost art of hardening copper has been discovered, and this invariably results in a deluge of letters to our association from new "discoverers." These have become so persistent that we have gone so far as to publish a leaflet on the subject, to answer inquiries. Otherwise at regular intervals it would require the services of a man and a stenographer to acknowledge and inform the writers that there is no such thing as the lost art of hardening copper.

The articles unearthed in Egypt disclose the fact that the ancients made their articles by hammering the metal, or cold-working. These artificers used the same method for hammering both copper and bronze. Heating of the products in open fires resulted in the formation of copper oxide, which alloyed with the copper and hardened it.

There are today two methods of hardening copper, just as there were centuries ago. One consists of alloying the copper with one or more other metal, such as zinc, tin, nickel, cadmium, chromium, cobalt, silicon, aluminum, iron, beryllium or arsenic; the other consists of cold-working the metal or copper alloy.

The silicon bronzes produced by members of this association, under their well-known trade names, have the strength of steel and the rust-proof and enduring qualities of copper. Not only have they strength and resistance to corrosion, but they are nonmagnetic, they are ductile and therefore easily worked, and can be welded. The alloys are available in many forms. These include hot rolled, cold rolled, or cold rolled and annealed sheets, plates, rolls and strips; hot rolled or cold-drawn rods, bars, and shafting; die-pressed or hammered forgings; rivets; welding rods in ingot form, etc.

Silicon bronzes as now manufactured have a third metal in their composition. Some have more than three. Those commonly added to the copper and silicon include manganese, zinc, iron, tin, and aluminum. The tensile strength annealed is approximately 55,000 lb. upward, and hard rolled or drawn 100,000 lb. per square inch and upward.

The silicon bronzes are being generally used for chemical equipment and in allied industries. These include water tanks and boilers, process tanks, fuel and oil lines, electrical conduit, hardware, bolts, under-water installations, screens, etc.

Silicon bronze has a general acceptance in bridge construction, for expansion and bed plates. Many states and transcontinental railroads, as well as highway departments, are using this alloy in building bridges. One of the many outstanding examples was the installation of 14½ miles of electrical conduit on the Delaware River Bridge. This bridge was opened to vehicular traffic in 1926, and this year, 10 years later, under the supervision of the Delaware River Joint Commission, work was completed on the high-speed rail transit line from Camden, N. J., to Philadelphia. It comprises a track on both sides of the vehicular highway. The passenger cars for the transit line include 1,500 ft. of a silicon electric metallic tubing and rigid conduit in normal sizes from ½ in. to 2 in. Some 700 silicon bronze fittings were used to assemble the conduit in each car. For the electrification and signal operation of the high-speed line 14½ miles of silicon bronze conduit was used in sizes of from 1½ in. to 4 in.

In the railroad field, silicon bronze is used for window frames, weatherstrip, and insect screens. For airplanes it is used for equipment in engines, landing gear, and variable-pitch propeller-hub cones. In the marine field its uses include hull plates and under-water parts of yachts, and for propellers.

Because of the ease of application, these alloys are used for welding purposes. They will, as a rule, alloy immediately with any metal whose surface is at red heat, whether ferrous or nonferrous.

Beryllium copper is another hardened alloy that is used in a diversity of fields. It possesses unusual physical properties,

(*Concluded on page* 78)

* Secretary, Copper & Brass Research Association.

SAFETY Without Decreasing Production or Increasing Production Costs

By D. W. JONES*

IT IS natural for one to want all of the advantages to be had by eliminating the unsafe practices which cause personal injuries, but we hesitate to take the steps required to obtain them. Let us consider for a moment just what causes a personal injury. We know that if we repeatedly expose any part of the body to injury, it is simply a question of time until we do get hurt. A personal injury occurs whenever the human body fails to function perfectly in an emergency. The failure may result from physical weakness, defective vision or defective hearing. The physical weakness may be due to exhaustion, ill health or disease. Defective vision may be due to age, muscular weakness or some external cause, such as dust or lack of light. Defective hearing may be due to the same causes as defective vision, with the addition of noise and confusion. As long as all of the human instincts and muscles function perfectly the human body is able to protect itself in most emergencies. Persons endowed so perfectly are the "lucky" ones who never get hurt. Fortunately most people are so blessed, otherwise the whole human race soon would be exterminated by the multitude of hazards which are confronted each day.

It might be suggested that instead of trying to eliminate the many natural hazards which exist to cause personal injury, we perfect man's few physical qualities to the extent required to combat all personal injury hazards. This is the principle used in developing prizefighters. A fighter trains himself to possess strength and stamina to resist a good beating in a fight. Circus performers are trained to do dangerous acts which very few people can do. Yet, we know that prize fighters get knocked out in the ring and circus performers fall to their death in spite of the high perfection of physical culture they achieve. If we did not attempt to eliminate the hazards and endeavor to train men to combat all which might arise, we would find the training expensive and soon exhaust our source of supply of men for hazardous work. The logical way to meet the situation is to remove as many of the hazards as possible and thus reduce the liabilities of injury which occur when an emergency arises and the human machine is caught off guard.

Safety work cannot be considered routine. It is the most highly specialized and diplomatic service we have to learn. Usually, when a new safety practice is suggested the first question asked is "How much will it reduce production," and second, "What will be the increased cost of production?" These questions come naturally, as it is a well known law of science that every action must have an equivalent and opposite reaction. If we persist in doing things in a dangerous way, personal injury will result eventually, and then any saving which might have been accumulated by the winnings of chance, will be spent to pay off the debt of the injury. This law is no different than another we know is true, that when a man continues to spend more than his income, he is headed for bankruptcy.

The new ideas of a safety program are along sensible lines. It is granted that the man who carries life insurance is living on a more substantial basis than the man who does not. He pays the premium on his policy and feels confident of his protection. Why should not the employers of men in all hazardous work look upon safety conditions as an insurance policy, pay the premium for safety devices and feel confident in the results which will be obtained. If a man's life insurance policy lapses he loses his protection, and likewise, when a company allows safety work to lapse, injuries multiply rapidly. A great number of men do not carry life insurance, and likewise numerous companies do not eliminate unsafe working practices. Both have the same idea in mind, that of expecting to pay the price some day, with the hope that the amount then paid will not exceed the premium which must be paid for protection with safety devices. It is a game of chance, and while some may win, the majority will lose. Why gamble with fate, when foresight and good judgment dictate otherwise.

Let us look at the hazards in coal mining and determine whether it is cheaper to meet them or avoid them. If it is necessary to adopt a rule that requires locomotives to come to a stop to permit the triprider to get on and off, the first problem confronted is the temporary slowing down of haulage. A man must think to be a safe worker, and we must give him time to think if we expect him to keep from getting hurt. After he has learned to think, however, and we surround him with conditions conducive to safety, he should soon be able to do his work without the delays previously encountered under the difficulties of unsafe practices. The final results of adopting safe practices are just as positive as the law of geometry which says that the shortest distance between two points is a straight line, and so the safe way is the best way always. When compensation costs are equal to a fair margin of profit, the best way to stay in business when the selling costs exceed the costs of production is to reduce the compensation costs. Instead of looking around for financial assistance to maintain bad conditions, why not invest in a substantial campaign for safety. We should look upon safe practices as a financial investment, bound to pay dividends. It may be necessary to make some capital expenditures, just the same as it is necessary for a man to pay the premium on his life insurance policy, but when we do invest in safety devices we buy something just as tangible as a loading machine or a locomotive. When a bond issue is made, we prepare a prospectus outlining the arguments for the issue. In making out investment in safety, we must do likewise and then conduct a campaign to sell safety ideas, and these ideas must be capable of paying their way as bonds. It is nice to stress the humanitarian side of safety work and speak of our efforts as being philanthropic, but nevertheless we expect a substantial return on our investment in safety. We buy new loading machines,

* Superintendent, Valier Coal Company.

cutting machines, locomotives, etc., because they fit into our plans of production and we expect to increase the efficiency of operation with them. Our arguments for safety must be just as substantial as those presented for the purchase of new machinery. To the casual thinker, the safety idea may appear interesting, since it suggests a way perhaps to get something for nothing. There is no formula for getting something without effort, as many people have discovered by wasting their time in trying to develop perpetual motion. Again, I mention that the fundamental law of nature is that every action has an equal and opposite reaction. You will get a return on your safety investment in the same proportion that you expend money and effort on the issue.

Since we are looking figuratively upon safety as an investment, we will consider how to proceed with our arguments and present the facts which must be on record. First, we must have an organization headed by conscientious and dependable salesmen. The supervisory force must be the safety salesmen, and they must be trained for their work by someone who has a thorough knowledge of what price must be paid for continuing unsafe practices. The United States Bureau of Mines has had many years of experience in analyzing accidents and their causes. They have a staff of engineers trained for safety instruction. Further, they stand ready and willing to give assistance when and where assistance is earnestly desired. The United States Bureau of Mines is organized to give the same service to coal mines in accident prevention instruction that a well established investment firm can give to companies seeking financial aid. As long as Government appropriations are available to finance the Bureau of Mines, there will be no charge for this assistance. What corporation would not consider itself fortunate to obtain the [illegible]ent aid and advice from an investment [illegible]ndpoint. The knowledge accumulated by the United States Bureau of Mines has been recorded in the form of lessons, divided into as many different groups as there are classifications in a coal mine. It is intended that mine foremen organize a class, elect officers, keep minutes of meetings and hold meetings at regular intervals. Questions are assigned to the different foremen and a written discussion must be prepared and read personally by each writer. The instructor of the United States Bureau of Mines opens the discussion of the paper and brings out facts for and against the opinion of the writer of the paper. If but one meeting is held each week, the complete course is so extensive and comprehensive that two years are required for completion.

New enterprises cannot be established without capital expenditures for buildings and equipment. Neither can our safety bonds be sold by our foremen-salesmen unless the safety adventure is built upon a substantial basis. It is not sufficient to talk safety, we must back up the arguments with material resistance. Many years ago it might not have been considered unusual if a baseball catcher did not wear protective equipment. But we have progressed in our ideas for safety in baseball and now even an amateur catcher is equipped with face mask, breast protector and shin guards. The catcher must stand up behind the batter and take the ball without fear of being hurt. The same reasoning applies to coal mining. Miners must have protective equipment so that they can face their jobs with confidence of safety. The essential protective equipment for a coal miner is a safety cap, safety shoes and goggles. These are the foundations which must be laid when an investment in safety work is undertaken. The safety cap and goggles are specialized articles and should be considered by the company as operating equipment, the same as track material and timber. The safety shoes are not applicable only to the mining industry and are properly considered personal wearing apparel. However, the company should see that employes obtain shoes which really afford toe protection, are made of first class leather and have a well designed steel toe cap, even if they must buy the shoes and sell to the workmen at cost. Buying safety shoes on price instead of quality is false economy.

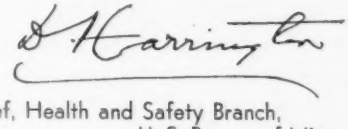
If protective equipment must be introduced progressively, the first item offered should be safety caps. The head is perhaps the most vulnerable and exposed part of a man's body while working in a coal mine. An earnest effort must be made to fit the men's heads in a comfortable and convenient manner. Some men have fixed ideas about the type of cap they need and a choice of different styles should be available. In fact, a change in style occasionally may create a little personal pride in appearance. The safety cap program must be put over by all means, as so many cases of lives being saved by safety caps are on record that they are considered as essential to a miner

\+ + +

SAFETY IN MINING

Safety and health, together with a reasonable measure of liberty and freedom, are among man's most precious possessions; for centuries he has struggled for liberty and freedom, health has been more or less consistently sought throughout the ages and with a fair measure of success, but in general safety has been given scant consideration until the present generation. The mining industry with its numerous inherent hazards has a much more difficult safety problem than any other major industry and notwithstanding the fact that our decreasing accident rate indicates definite progress, mining still has the poorest accident rate of all of the major industries. If it weren't for the hundreds of fine safety performances of progressive mines, such as the Valier, one might be inclined to be fatalistic and think that mines simply cannot be made safe; however, the Valier mines and many others show by their excellent safety performances that mining can be conducted safely and at the same time maintain competitive cost status.

Safety effort of a fairly effective nature is, however, almost in its infancy in mining though spasmodic safety activities (and a limited amount of really effective safety work) have been in effect in various mining organizations and localities for several years. The safety work which has been done, however, has established the fact that by expenditure of a reasonable amount of sincere, effective effort at least 50 percent (probably as much as 75 percent) of present-day accident occurrence in our mines can be avoided; the rate of occurrence of mining accidents has fallen steadily (even if somewhat slowly) and this is especially true of the past five years, the coal mining fatality rate for 1936 to date being far lower than in any similar period in the history of the industry in the United States. There is the best of reasons to believe that as time goes along, more and yet more mining organizations will become "infected" with safety consciousness somewhat like that now "afflicting" the Valier Coal Company, and we can confidently expect that in the coming decade, the mining industry will accomplish more in safety of operation than has been done in generations in the past.



Chief, Health and Safety Branch,
U. S. Bureau of Mines.

\+ + +

as a glove is to a baseball player.

Safety shoes are the second item to be introduced. Toes are not a vital necessity to a man, but he has many of them which may be paid for in compensation. The steel cap adds but little to the cost of the shoes. A man must wear shoes of some kind so why not have the protection of the steel toe cap for the slight additional cost.

The third item of safety investment is goggles, and that is a problem requiring much study and cannot be analyzed en-masse. Each mining classification has a different eye hazard, and what is good for a motorman might create an additional hazard for a face-man. Again, a man cleaning road or rock dusting needs protection from dust only and not flying particles. A miner will usually wear a safety cap and safety shoes when he is comfortably fitted, but when it comes to wearing goggles, he appreciates the advisability of protecting his sight, but he objects to anything which adds to his discomfort. Spectacles or goggles cannot be worn by anyone without some inconvenience, and this is the fact which makes it difficult to solve the eye protection problem in a coal mine. Since goggles and spectacles cannot be fitted to a man like a pair of shoes, it is essential that this subject be approached in a different manner. Each individual must be considered a separate problem. It would be useless to put the finest goggles made on a man with defective vision—he would have protection only from flying particles and dust. He would not be able to see the numerous hazards about him which might cause bodily injury. Then man who has defective vision will be responsive to any suggestion which will restore his sight to normal and give him protection against eye injury. He knows from personal experience what value to place upon his eyes and has worked under the handicap of poor sight so long that he will not emphasize the detail of inconvenience which is so readily offered by men with good sight. Diplomacy must be used in the introduction of goggles, so why not start where you know you cannot fail. If a man wears spectacles while away from the mine, it is reasonable to assume that he does not see very well without them. If he takes off his spectacles when he goes into the mine, it is likewise reasonable to assume that he is working under the handicap of not seeing very well and therefore is more liable to be an inefficient workman and afford more exposure to injury than a man with two good eyes. If the company cannot eliminate the services of men with poor vision, they certainly should make an investment in safety for them and consider the cost as the premium required to obtain a full day's work from them. If all of the men working in a coal mine with defective vision were equipped with prescription spectacles, the problem of introducing goggles to the balance of the men would be certain of success. Just as safety caps were considered somewhat freakish when first introduced, safety spectacles will be looked upon in the same manner, but, the men wearing them have more at stake than eye protection, they have real vision. They would not wear their so-called dress spectacles in a coal mine due to the hazard of breakage, but they will go a long way in suffering inconvenience if fitted with a good practical pair of safety spectacles such as are on the market at present with full view vision.

After the first step of providing prescription spectacles is taken, it is surprising how many men with good vision will become interested in eye protection and ask for plain glass safety spectacles. Face-men can wear them with very little inconvenience, and while protection is offered from flying particles directed only to the front of the face, the danger of being struck from the side is slight and side shields are hardly worthwhile when the additional hazard of eye-blinders is considered. Eye cup goggles are not practical for face-men for the additional reason that they are subject to sweating and fogging. Haulage men require the full protection of eye cup goggles as their vision is practically all ahead and the blinder action is not noticeable. Full eye enclosure is further required to avoid getting dust in the eyes. If a haulage man requires prescription spectacles he should have them, and in addition, wear a pair of so-called coverall eye cup goggles over them. Dustmen and road cleaners require air tight goggles, fitted with face fitting rubber frames. Of course, these cannot be worn continuously without cleaning, but neither can a man work constantly in dust without eye protection. Frequent cleaning must be considered a part of the work, just as a man takes time out to get dust out of his eyes. All goggles are usually equipped with head bands, except the prescription spectacles, and they must be fitted accurately to the eyes, but when plain safety glass spectacles are used, without correction for vision, they also may be fitted with head bands instead of ear pieces and thus make it convenient for them to be dropped around the neck when not required for eye protection. This is really an advantage, as the wearer does not have to take them off his person when not in use and carry them in a case. Usually a coal miner does not have good pockets in which to carry them and they would soon be lost.

Item four in our capital expenditures for safety is the respirator. Several types are in use for specific purposes. Shot firers should be equipped with a substantial type for continuous wear. The dry type now used is sanitary and efficient. Filter paper discs can be carried and renewed as often as necessary to afford free breathing. For others, a simple and inexpensive dry type is available, and consists of an aluminum face place to cover a cloth gauze. This cloth covers the nose and mouth and is held in place by the thin metal plate. This respirator is suitable for all face men when working in dusty places.

After the ground work has been laid for safety, by the capital expenditures for equipment, it is up to the supervisory men to show their salesmanship and get results. The ideas which originated in the classroom must be carried out under actual conditions. In order to face the program intelligently, and realize where it is possible to make the greatest savings on the safety investment, the liabilities are listed, as follows:

A man's head constantly is exposed to danger in a coal mine. Without safety caps in use it is quite probable that a death may result from a cracked skull at any time. If but one fatality is prevented by the investment in safety caps, the company can take a safety credit of 6,000 man-days. In Illinois this has a value of $4,000 in compensation for a married man. Figure out for yourself how many caps can be purchased for $4,000 and then determine how long it might take you to write off the expenditure made for the safety caps. On the other hand, if it is assumed that no fatality will result, it can be determined from past compensation costs how long a time would be required to balance the expenditure by taking credit for the minor head injuries which occur regularly without head protection.

If it is necessary for the company to purchase safety shoes and sell them to the men at cost in order to provide them with good shoes at a fair price, it is not necessary to save more than the carrying charge to balance the shoe budget. As stated before, a man's toes are not vital, but he has many of them, and rated in man-days if lost, they represent the following value:

One foot if lost is rated 40 percent of total disability, and is equivalent to the loss of 2,400 man-days to the company. In Illinois, this has a value of $1,500 in compensation.

The great toe, or any two or more toes, if lost represents 5 percent total disability, and the company loses 300 man-days, with a compensation cost of $400.

If a man loses but one toe other than the great toe, the company loses 72 man-days, with a compensation cost of $125.

Out of the saving made by eliminating toe injuries through the use of safety shoes, any company could probably make the carrying charge and in addition give each employe a yearly Christmas present of a pair of safety shoes.

In the case of eye protection, it is suggested that the company study compensation costs for the past five years and ascertain what expenditure has been made to employes for eye injuries. If a balanced budget is desired, that particular sum of money may be set aside to the credit of safety goggles and spectacles in a five-year campaign to prevent eye injuries. In figuring the probable expenditures required, it is well to consider the liabilities without protection, as follows:

The loss of sight in both eyes is total disability, and one such injury would charge the company with a loss of 6,000 man-days, having a compensation value of $4,000. This amount would finance an extensive investment in eye protection.

The loss of but one eye is 30 percent total disability, or 1,800 man-days lost. The cash value in compensation each

It is evident from the magnitude of the liability, that eye protection is worthy of a considerable amount of expenditure and still pay large returns. As in the case of safety shoes and head injuries, the compensation paid for minor eye injuries in time would retire the amount expended for eye protection.

In the above discussion we have considered the returns which must be made on capital expenditures for safety in order to make the investment profitable. Safety education has more possibilities than paying dividends on cash expenditures. When a man is once trained to work under safe conditions, many so-called "unavoidable accidents" will not occur. Good judgment cannot be capitalized but it can pay a substantial financial return when given an opportunity to function. For instance, roof falls are a common cause of fatalities in coal mines. The expenditure for timber cannot be charged entirely to safety, as props must be used under any conditions to make it possible to extract the coal. If the training in safety results in a man's life being saved by timber being placed before the fall occurs instead of after, the company can credit the safety investment with a saving of 6,000 man-days, or $4,000 in compensation without any additional cash expenditure. This amount of money incidentally will buy from 19,000 to 25,000 props, depending on size.

Another example of getting safety returns without a cash expenditure is in the mine haulage. Suppose it is decided to stop tripriders getting on and off moving cars and locomotives, and running along the track in front of moving haulage equipment, and it is necessary to slow down the speed of haulage somewhat to educate the men along the new lines of safety. It might be shown that a definite number of tons were lost in production during the period of training under new conditions. Suppose further, that over a period of years one man's life was saved by the elimination of haulage hazards under the new ideas of operation. A saving of 6,000 man-days has been made, and if this is reduced to operating days for a large mine employing 500 men, it is equivalent to the entire working man power of that mine for a period of 12 full days. If the mine capacity is 7,000 tons per day, the man power lost by the death of that one haulage man is equivalent to the production of 84,000 tons of coal. The compensation loss may be but $4,000, but rated in terms of man power, the physical loss is tremendous. It is not pleasant to rate humans as physical power, and the spiritual and humanitarian sides cannot be ignored. If the savings which inevitably result from safety in operation are reduced to tonnage, every mine can produce less tonnage and make the same return by eliminating expenditures for compensation.

Before concluding, I wish to give you some actual operating facts. While it is up to the company to initiate the safety program, provide rules and facilities for carrying out safety campaign to a definite conclusion, it is absolutely necessary to have the full cooperation of the employes, and this full cooperation cannot be asked for and received without sharing at least a small part of the gain. In order to hold an employe's interest in safety, and i n s u r e his continuous alertness and use of good judgment, he must have something to look forward to in return, even though it is but some article of relatively small intrinsic value. Letters of commendation are looked upon with appreciation, but the most cherished article of appreciation are things such as pocket knives, overalls and shoes. At Valier, we owe the excellent cooperation from our men to the considerations we have given them.

All of our supervisory force was trained by the United States Bureau of Mines in the manner suggested. Our foremen were trained to be the salesmen of safety. Before deciding upon new ideas, we first found out whether they were practical by having each foreman make an honest effort to work out the details with his men. At the end of the first year of our efforts, the records were checked and every employe of the company who did not have a lost time accident during the year was given a pocket knife with his name engraved on it. This was a personal gift to the man from the company as an expression of its appreciation of the efforts made by that man during the whole year to promote safety in our working conditions. The reaction was more favorable than expected. The employes valued that gift far beyond its intrinsic value. Although the company did not make any promises for the future, it was generally understood that some sort of appreciation would be given for the second year. The safety record for the second year was even better than the first, and in order to make the appreciation gift more in proportion to the saving, each employe who did not have a lost time accident for the second year was given his choice of any pair of safety shoes in our supply house without

+ + +

SOME RELATIVELY RECENT RECORDS IN SAFETY ESTABLISHED BY HIGHLY MECHANIZED COAL MINES IN THE UNITED STATES

Below are a few of the relatively recent outstanding safety records established by highly mechanized coal mines in the United States:

Zeigler No. 1 mine, Bell and Zoller Coal and Mining Co., Zeigler, Ill., operated from December 5, 1930, to December 7, 1934, without an underground fatality, producing 3,084,565 tons of coal in 3,154,605 man-hours.

No. 15 mine, Consolidated Coal Company of St. Louis, Mt. Olive, Ill., produced 1,826,006 tons of coal in 1,646,735 man-hours from the date of the last fatality (February 13, 1932) to January 1, 1935, accident frequency in 1934 being 82.88 and accident severity 5.26.

No. 45 mine, Sheridan-Wyoming Coal Co., Monarch, Wyo., operated without a fatality from December 3, 1924, to January 1, 1935, with production of 2,943,372 tons of coal.

No. 4 mine, the Union Pacific Coal Co., Rock Springs, Wyo., operated without a fatality from April 17, 1923, to January 6, 1936, producing 3,490,329 tons of coal in 4,313,040 man-hours of work.

No. 1 mine, Knox Consolidated Coal Corp., Bicknell, Ind., reduced accident frequency from 187.32 in 1932, to 48.16 in 1934, and accident severity from 41.14 in 1932, to 1.5 in 1934. (The National Safety Council reports that for 1935 the average accident frequency rate for mining was 49.46 and average accident severity rate was 10.14.)

No. 9 mine, Peabody Coal Co., Springfield, Ill., operated without a fatality from July 4, 1930, to October 26, 1935, with production of 1,639,596 tons of coal in 1,870,738 man-hours.

Kathleen mine, Union Colliery Co., Dowell, Ill., operated without a fatality from December 29, 1933, to December 13, 1935, producing 1,452,452 tons of coal in 1,284,576 man-hours.

No. 1 mine, the Valier Coal Company, Valier, Ill., reduced accident severity from 29.9 in 1927, to 2.22 in 1935.

No. 11 (open pit) mine of the United Electric Companies, DuQuoin, Ill., operated without a fatality from the opening of the property in 1929 to January 1, 1936, producing 5,404,283 tons of coal and moving nearly 86,000,000 tons of overburden.

Mine No. 3, Superior Coal Co., Gillespie, Ill., operated without a fatality from May 28, 1931, to May 13, 1935, producing 2,431,618 tons of coal in 2,705,135 man-hours.

"C" mine, Union Pacific Coal Co., Superior, Wyo., operated without a lost-time accident from October 21, 1933, to December 31, 1934, producing 256,982 tons of coal in 252,636 man-hours.

Probably the outstanding still unbroken safety record in coal mining in the United States at the present time is that of the Ingram Branch mine, Elkhorn Piney Coal Mining Co., Ingram Branch, W. Va., which operated without a lost-time accident from July 25, 1933, to January 28, 1936, producing 354,296 tons of coal (hand loaded) in 543,258 man-hours.

+ + +

cost. Enthusiasm continued to increase, and to give the men somewhat quicker returns, for the third year it was decided to issue shoe credits quarterly as part payments of the yearly expression of appreciation. That is, at the end of the first three months of operation in the year, each man who did not have a lost time accident during that quarter was given a one-fourth credit on a pair of shoes. If he was in need of new shoes, he could pay three-fourths of the regular price of the shoes and obtain them immediately. Likewise, at the end of the second and third quarters credits were issued. We found that many of the men were obtaining additional benefit from safety shoes by wearing better shoes to work in, and not waiting until the end of the year to replace wornout and useless shoes.

As we continued to study our safety work and analyze accidents to individuals, it was learned that most men are safe workers naturally, and apparently it is not difficult for them to comply with safety rules. However, there are many men who are naturally careless. A man who has neglected safety suggestions for years cannot be converted into a safe worker overnight. He must go through severe training. We all know that the company is at a disadvantage in dealing with such men, as they cannot always be discharged for their recklessness. There is an effective way to handle such so-called "compensation-hounds" and that is through the men themselves. We took advantage of the opportunity in the following manner. We divided all of the employes into working groups and they were advised that each group which went through the calendar year without a lost time accident in the group, would be given overalls. More enthusiasm was created, as this made the individual of each group his brother's keeper. It is easily seen how safety efforts were pyramided in each group, and it was gratifying to see how careless men were disciplined by members of a crew to keep them from getting hurt. The simple reward of a pair of overalls kept the men on edge at all times. Safety rules were no longer looked upon as commands and "don'ts" but taken as considerate suggestions to them as means to prevent a lost time accident—and in return receive a pair of overalls. The new overalls were worn with pride by those receiving them, and the unfortunate ones resolved to take steps to be among those known as safe workers during the following year.

I have endeavored to explain how it is possible to have safety without increasing production costs by the foregoing discussion, and now as to the second question, "How to have safety without decreasing production," will state briefly how this problem was solved. In order to prevent a permanent sag in production due to the somewhat drastic change in operating conditions sometimes required, the employes were divided into operation groups, somewhat similar to those known as safety groups already explained. The operating conditions for each group were given a rating, and on this rating was based a high tonnage production as a goal to be reached during the year. Of course, this goal was set far above the tonnage which could be obtained without exceptional effort. During the year, as a production group reached the goal established for tonnage, the members of that group were each given a pair of overalls as an expression of appreciation from the company for demonstrating that even under the feared handicap of safety rules, it was possible not only to maintain normal tonnage but to exceed it. It is needless to say that the reward was not won by the first attempt, but required many efforts with many near successes before the goal was reached, and these continued efforts resulted in maintaining the production of high tonnage with safety. It was thoroughly understood that the high tonnage goal had to be reached without violating safety rules and without a lost time accident.

In conclusion will say that safety can be obtained without decreasing production or increasing production costs, but the company must be honest, sincere and appreciative of the cooperation of the employes in a material way.

The Future of Gold Mining

(*Continued from page* 27)

as we engineers do, but who were more disposed to take a chance.

The story is told of Marcus Daly, that to a scout in his employ who had been fruitlessly searching for a new property for several years and coming back at intervals to report no success, Daly finally, in exasperation, said, "Why in hell don't you go out and spend forty or fifty thousand for me once in a while? You might find a mine."

The late great Frederick W. Bradley once enunciated to me in private conversation another great truth comparable in its significance with Marcus Daly's remark. "Certain men," said Bradley, "do not seem to realize that one must be very patient with some of these prospects." We need more of Daly's nerve and of Bradley's patience in mine development.

But in any event, there are enough successful gold operations in Montana and other Western States at the present time to assure us that under the stimulus of the new gold price, and before the spectre of rising costs can catch up with us, the West will continue to increase her gold production materially.

Haulage and Hoisting Practice

(*Continued from page* 67)

drum is 120 ft. 1 in., while the corresponding horizontal distance is 148 ft. 5¼ in.

Safety hooks are installed at the sheaves to hold the skip in event of rope failure due to overwind.

Ore hoist is Nordberg, double drum, geared, electric. Drum face diameter is 9 ft. 10 in., with 5-ft. face. Drums are of steel plate, cylindrical, and are helical grooved, ⅛-in. deep with 1-13/16-groove pitch. Present hoisting conditions are satisfied with one rope layer.

One drum is keyed to the shaft and the other clutched to the shaft by a Nordberg, axial, plate clutch. Brakes are gravity, parallel motion, post type and have hydraulic control, as has also the clutch.

The hoist gear wheel is pinion driven by two D. C. motors, each of 1400 h-p., and mounted on opposite sides of the gear wheel. Power consumption is 1 k.w.h. per ton. Acceleration time is 11.4 seconds to full speed of 2,250 ft. per minute, and retardation to dump is 12½ seconds. Hoist operation is automatic, excepting in so far as its starting is controlled by the skip tender. However, hand operation is possible when so desired.

Bull Cliffs Isabella Dump, Cripple Creek, Colo.

Mechanization Trends

Reports of Coal Operators Committees

Cutting Bit Treatment

THE report below submitted by Mr. Thomas A. Stroup shows a survey of cutting bit practices and machine performances compiled from records of representative companies by the District Committee of Central West Virginia. A study of these figures brings out several points worth noting.

In the first place, the number of tons produced should not be used for comparing different cutting machine performances as the tonnage depends directly on the height of the seam. In order to get a better comparison, the unit of measurement should be the number of square feet of kerf cut. In this connection attention is called to the mechanical loading operation shown in Mine No. 4 where the performance appears to be much lower than in the hand-loading mines. However, this machine makes a 16-in. kerf and, while the report does not say so, evidently a second or perhaps a raking cut is made across each working place. Therefore, it would seem that the number of square feet reported in this operation should at least be doubled in order to give true comparison with the other mines.

The figures for the man-hours in a typical machine shift show the advantage which could be gained through the development of a bit with a higher cutting efficiency than those now used. For example, an average of the four mines shows that the machine crew spend approximately one hour of the shift in changing bits. The average number of bits used is 196, which is more than four complete bit changes. If a point would last for an entire shift, then there would be but 15 minutes instead of one hour required for setting bits. This would add 45 minutes to the cutting time of the machine crew; allowing them to cut two extra places and increasing their production by about 40 tons per shift.

REPORT ON CUTTING-BIT TREATMENT PREPARED BY THE DISTRICT COMMITTEE OF CENTRAL WEST VIRGINIA

General Description	Mine No. 1	Mine No. 2	Mine No. 3	Mine No. 4
Height of seam	63 in.	72 in.	62 in.	72 in.
Character of material cut	Medium hard coal.	Hard coal.	Hard with sulfur balls.	Very hard bone, sulfur and slate.
Type of cutting machine	Track-mounted.	Track-mounted.	Track-mounted.	Track-mounted.
Depth of cut	6½ ft.	6 ft.	5.25 ft.	6 ft.
Thickness of kerf	6 in.	4 in.	6 in.	16 in. for mechanical loading, 6 in. for hand loading.
Location of cut	Top.	Bottom.	Bottom.	Center.
Bit Treatment				
Type of bit	Pick point.	Rolled bit cut on 30°.	Pick point.	Pick point.
Type of bit steel	Spec'l analysis open hearth.	Special analysis steel.	.....	.....
Method of sharpening	Roller type sharpener.	Mechanical bit sharpener.	Mechanical bit sharpener.	Mechanical bit sharpener.
Method of tempering	Soapy boiling water.	Soapy boiling water.	Special tempering solution.	Soapy boiling water.
Type of tipping	None.	None.	None.	None.
Man-hours to sharpen 100 bits	0.58 man-hours.	0.41 man-hours.	0.5 man-hours.	0.3 man-hours.
Times bit resharpened	40 to 60 times.	60 to 70 times.	12 times.	47 times.
Location sharpening shop	1,000 ft. from mine.	4 miles from mine.	2½ miles from workings.	1 mile from mine.
Method of delivering bits	By supply crew.	Truck to mine. Supply crew in mine.	By regular supply crew.	Truck to mine. Supply crew in mine.
One Machine Shift Performance				**Hand Loading:** / **Mechanical Loading:**
Number places cut	Average 20 places.	Average 20 places.	21.5 places.	20 places. / 7 places.
Tons cut	320 tons.	490 tons.	357.76 tons.	500 tons. / 175 tons.
Square feet of kerf cut	2,080 sq. ft.	Average 2,040 sq. ft.	1,754 sq. ft.	2,400 sq. ft. / 980 sq. ft.
Number of bits used	120 bits.	Average 271 bits.	225 bits.	170 bits. / 235 bits.
Square feet kerf cut per bit	17+ sq. ft.	7.5 sq. ft.	7.8 sq. ft.	14 sq. ft. / 4.2 sq. ft.
Man-Hours for One Machine Shift				
Man-hours cutting and tramming	13.5 man-hours.	10.7 man-hours.	12.60 man-hours.	12.7 man-hrs. / 12 man-hrs.
Man-hours changing bits	1.5 man-hours.	3.3 man hours.	1.61 man-hours.	1.3 man-hrs. / 2 man-hrs.
Man-hours delivering bits	7 man-hours (for mine).	1.3 man hours.	.....	None extra. / None extra.
Man-hours sharpening bits	0.7 man-hours.	1.11 man hours.	1.125 man-hours.	0.5 man-hrs. / 0.7 man-hrs.
Conclusions				
What factors have caused the adoption of your present bits	Experience taught that this bit best adapted to our seam.		The present type of bit has been used at this plant for a number of years and has given better service than other bits and chains with which we have experimented.	Cost.
What advantages has present practice over other practices used	Cleaner and freer cutting resulting in coarser cuttings.	Economical advantages.		Cost.
What difficulties have you encountered in cutting or in bit service, and how have you overcome them	Excessive breakage of bits due to improper tempering. This overcome by experiment until present method was found.			No serious difficulty.

Submitted by THOMAS A. STROUP,
Committee of Central West Virginia.

Copper Alloys in Industry

(*Continued from page* 71)

many of which are obtained by means of a final "precipitation" heat treatment which produces tensile strengths approaching 200,000 lb. per square inch.

Beryllium copper is available in many forms, which include thick plates, or sheets as thin as .002 in.; strips; rods 5 in. or more in diameter to wire as fine as .010 in. diameter; tubes containing 1.75 percent beryllium, in the more common sizes up to and including 1¼ in. (outside diameter).

Uses for this product include: Fuse clips, switch blades, vibrator arms, contact brushes, appliance-plug clips, hand tools (i. e., hammers, picks, scrapers, chisels, screwdrivers, crowbars, knives, etc.), surgical and dental instrument handles, bolts and screws, precision bearings and bushings, ball cages, watch parts, firing pins, adjustable-pitch propeller-hub cones, welding electrodes, spring washers, woven cloth, etc.

And so the art of alloying and hardening copper has been perfected to such an extent that the ancient Egyptians would today be as surprised to discover this fact as would Columbus if he could gaze at the skyline of downtown New York.

● THE Forty-Fourth Annual Meeting of the Illinois Mining Institute will be held Friday, October 23, 1936, at Springfield, Ill. Headquarters will be at the Hotel Abraham Lincoln.

● THE National Industrial Advertisers' Association will hold its Fourteenth Annual Conference at the Hotel Benjamin Franklin, Philadelphia, Pa., October 5, 6, and 7, 1936.

● THE American Mining Congress announces the publication of a booklet entitled *Frogs, Switches & Turnouts for Coal Mine Tracks.* This is a reprint of two pamphlets published by the American Mining Congress in 1932 and 1934, showing recommendations prepared by its Track Committee. These recommendations have been accepted by the American Standards Association and are used quite extensively by manufacturers of track equipment.

The book is convenient pocket size—5½ x 8 in.—and is bound with a heavy paper cover. It contains 64 pages of drawings and tables, and shows all structural details as well as dimensions for complete mine turnouts of various sizes and track gages. The price is 30 cents each with a 10 per cent discount on order for 10 or more. A condensed table of contents follows:

TABLE OF CONTENTS

Frogs, Switches and Turnouts for Coal Mine Tracks

Drawings for Light Rail Turnouts (20 to 60 lb. rail):

Riveted plate frogs for room turnouts.
Riveted plate frogs for main haulage turnouts.
Cast steel frogs for room and main haulage.
Side jaw clip—20 to 60 lb. rail.
Flat switch plate—C. I. base and steel base.
Riser switch plate—20 to 60 lb. rail.
Switch heel plates—20 to 60 lb. rail.
3'6" switch, flat plates—20 and 30 lb. rail.
3'6" switch, riser plates—20 to 40 lb. rail.
5'0" switch, flat plates—20 and 30 lb. rail.
5'0" switch, riser plates—20 to 40 lb. rail.
5'0" switch, riser plates—50 and 60 lb. rail.
7'6" switch, riser plates—40 to 60 lb. rail.
10' switch, riser plates—40 to 60 lb. rail.
Turnout formula.
Standard turnout dimensions—42" gage.
Turnout data for 30" gage. Nos. 2, 2½, 3, 4, 5, 6.
Turnout data for 36" gage. Nos. 2, 2½, 3, 4, 5, 6.
Turnout data for 48" gage. Nos. 2, 2½, 3, 4, 5, 6.
Turnout data for 56½" gage. Nos. 2, 2½, 3, 4, 5, 6.
No. 2 turnout 42" gage.
No. 2½ turnout 42" gage.
No. 3 turnout 42" gage.
No. 4 turnout 42" gage.
No. 5 turnout 42" gage.
No. 6 turnout 42" gage—7'6" switch.
No. 6 turnout 42" gage—10' switch.
Guard rails—20 to 60 lb. rail.

Drawings for Heavy Rail Turnouts (70 to 80 lb. rail):

Bolted frogs for main haulage turnouts.
Cast steel frogs for main haulage turnouts.
Theoretical calculations for standard turnout.
Turnout data for 30" gage. Nos. 3, 4, 5, 6.
Turnout data for 36" gage. Nos. 3, 4, 5, 6.
Turnout data for 48" gage. Nos. 3, 4, 5, 6.
Turnout data for 56½" gage. Nos. 3, 4, 5, 6.
No. 3 turnout for 42" gage.
No. 4 turnout for 42" gage.
No. 5 turnout for 42" gage.
No. 6 turnout for 42" gage.
7'6" split switch with riser plates.
10'0" split switch with riser plates.

Steel Tie Spacing:

Nos. 3, 4, and 5 main haulage turnouts.
No. 6 turnouts—7'6" and 10'0" switch.
Steel tie spacing for room turnouts.

Ajax and Portland Mines from Victor, Colo.

News and Views

of Interest to Mining Men

● AT the annual meeting of the Mining Association of Montana, held in Butte on July 17 and 18, Carl J. Trauerman and Frederick C. Gilbert, Butte, were reelected president and secretary-treasurer, Dr. Francis A. Thomson, Butte, was reelected chairman of the executive committee and Stanley R. Moore, Wilborn, was elected vice president. The reelected officers are now beginning their third terms.

● THE ANTHRACITE INSTITUTE announces that copies in printed pamphlet form of the award of the Anthracite Coal Strike Commission of 1902-03, with subsequent agreements and resolutions of the Board of Conciliation, printed as of July 1, 1936, and including the agreement of May 7, 1936, have been received from Mr. John Boylan, secretary of the Anthracite Board of Conciliation, and are available upon request to the office of the Institute at Primos, Pa.

● WORKING stock control of the Jardine Mining Company, Jardine, Mont., has passed from the Bacorn-Stifel interest to a New York syndicate, according to announcement recently made by Harry C. Bacorn, for many years president and general manager of the company, who was associated with the Stifel interests of Wheeling, W. Va., and St. Louis, Mo. Mr. Bacorn recently resigned his position with the company and has been succeeded by Newton H. Emmons, prominent mining engineer of Seattle. H. J. Fennimore, Butte accountant, has been made treasurer of the company. The Bacorn-Stifel interests took over the property more than 15 years ago and have made it a successful producer of gold, arsenic and tungsten, the company having paid a dividend of 10 cents per share on its outstanding 650,000 shares last January. Mr. Bacorn is a mining engineer, a director in the Gold Mining Association of America and for two years was vice president of the Mining Association of Montana.

● ERMONT MINING COMPANY, of Bannack, has let a contract to build a mill to E. C. (Pat) Sweeney, of Denver.

● THE forty-fourth annual meeting of the Illinois Mining Institute will be held on October 23, 1936, at the Hotel Abraham Lincoln, at Springfield, Ill.

● AUTHORIZATIONS and commitments of the Reconstruction Finance Corporation in the recovery program to July 31, including disbursements of $859,828,843.23 to other governmental agencies and $1,799,981,085.27 for relief, have been $11,293,677,792.54. Of this sum, $1,119,168,155.82 has been canceled and $1,067,015,288.64 remains available to the borrowers and to banks in the purchase of preferred stock and capital notes. The relief disbursements include $299,984,999.00 advanced directly to states by the corporation, $499,996,086.27 to the states upon certification of the Federal Emergency Relief Administrator, $500,000,000 to the Federal Emergency Relief Administrator under provisions of the Emergency Appropriation Act, 1935, and $500,000,000 under the provisions of the Emergency Relief Appropriation Act, 1935. Of the total disbursements, $6,184,972,523.48 was expended for activities of the corporation other than advances to governmental agencies and for relief, and of this sum $4,126,440,068.97, or approximately 67 percent, has been repaid.

● THE most vigorous blow yet struck to halt the flow of stolen anthracite into eastern markets was made suddenly on Friday afternoon, August 7, when 10 drivers of "bootleg" trucks and 2 other men who were charged with receiving stolen goods were arrested and taken at once to the office of the district attorney of the County of New York, where they were examined by Assistant District Attorney John C. McDermott and then locked up.

Frank L. Nowasatka, proprietor of the "Shamokin Coal Lines," and William Slutsky, of "The W. & S. Coal Company," were held on the charge of receiving stolen goods, and the drivers were locked up as material witnesses. The evidence in these cases will be presented to the grand jury shortly, and it is possible the problem of stolen anthracite and its effect on New York markets will be gone into very thoroughly by that body.

To familiarize himself with the whole situation Mr. McDermott, accompanied by Capt. Richard Fennelly and Detective J. J. Kissane, of the New York police department, spent three days in the southern anthracite region recently and traced the route of stolen fuel from the coal holes to New York City. Since returning to his office he has worked night and day collecting and preparing the evidence which he believes will convince court and jury that stolen anthracite should be kept out of the New York markets. Cooperating with Mr. McDermott in getting the necessary facts are Mr. L. C. Madeira III, of the Anthracite Institute; Mr. Roderick Stephens, Coordinator for the Retail Solid Fuel Industry of the City of New York; and Mr. T. T. Toole, of the Philadelphia & Reading Coal & Iron Company.

● "OVER 40 MILLION TONS" is the title of an attractively printed folder just published by Appalachian Coals, Inc., Cincinnati, Ohio, listing the producing companies which mine the high-volatile coals distributed by this pioneer regional marketing agency. Established in April, 1933, the Appalachian organization markets the products of its affiliated producers from Kentucky, Tennessee, Virginia, and West Virginia.

Views from Zion Park, Utah.

● D. C. JACKLING, president, Utah Copper Co., recently stated to the press, that while the immediate outlook for copper was comparatively satisfactory, he did not think American producers again would ever enjoy a period similar to that between 1926 and 1929, when a substantial percentage of copper production was exported. He said that at present only fabricated copper is being shipped abroad.

Mr. Jackling expressed the belief, however, that the copper producing industry is coming back to a new normal, vastly more satisfactory than has pertained during the past five years, as the result of new uses for copper, specifying air conditioning and the more general using of copper in steel alloys. Mr. Jackling says air conditioning is the biggest boost for copper since the coming of the electical age.

He predicted that eventually all high-quality steel rails will contain copper alloys. He credits the continuous study of scientists, who are ever seeking more efficient uses of raw material, for the growing demand for copper, rather than the "ruinously low" prices of that metal during the last few years.

The present price of 9¾ cents a pound, Mr. Jackling stated, gives only the most favorably situated producers a moderate profit, while most producers cannot operate.

● IN 1935 metal mines in Texas produced 72,222 tons of ore yielding, in terms of recovered metals, 518 fine ounces of gold, 1,000,960 fine ounces of silver, 28,000 pounds of copper, and 1,043,000 pounds of lead, valued in all at $781,614, according to Chas. W. Henderson and A. J. Martin, United States Bureau of Mines.

● INSTALLATION, degree conferment and memorial exercises made up the formal program of August 6 which featured the Michigan College of Mining and Technology's three-day fiftieth anniversary alumni reunion at Houghton, August 5-7. Grover C. Dillman was officially inaugurated, and the Doctor of Engineering degree was then bestowed on him and on Nathan S. Osborn, U. S. Bureau of Standards physicist and a Tech alumnus. Treasurer N. F. Kaiser presented to the college a copper plaque and photographs honoring all present and past board of control members and executive heads of the institution.

● THE WHITE HOUSE conference on tax matters brought into sharp relief the entire question of taxes, particularly the situation existing due to the enactment of the Revenue Act of 1936. The Treasury decision recently made public, seeking to simplify points in connection with the taxation of undistributed earnings, was issued in advance of the actual filing of returns at the end of the year in an effort to clarify points in question.

The Treasury decision, comprising 30 pages of closely spaced type, was broken down into these major sections:

1. An outline with definitions of terms of the act of 1936.

2. Explaining the surtax on undistributed profits and outlining sample computations under this heading for typical corporations.

3. Corporation credit for dividends paid, which would include dividend carryover, stock dividends, dividends in kind, distributions in liquidation, preferential dividends, nontaxable distributions, effective date of payment of dividends.

4. Corporation distributions of all kinds in which all forms of dividends are considered and examples given of their taxability.

5. Credits allowed corporations, including interest on United States obligations, dividends received, contracts restricting payment of dividends, bank affiliates and national mortgage associations, and sample computations in most cases.

The Treasury Department experts, in discussing the decision, believed that no legal entanglements, comparable to the hundreds of suits which involved collection of the processing taxes under the AAA, could be expected. They said the taxpayer would have no trouble in computing tax if he would bear in mind the principle of the act that all corporate earnings must pay a tax, either by the corporation or by the shareholder, and that the former exemption of corporation dividends from the normal personal income tax of 4 percent no longer applies. —(*Bulletin, American Mining Congress.*)

● CONSTRUCTION of ten one-story bungalow type houses of copper has been started in Bethesda, suburb of Washington, D. C., by Copper Houses, Inc., a subsidiary of Kennecott. It is tentatively planned to erect 90 more such houses, some possibly larger, depending upon public reaction. Copper Houses, Inc., was formed early in 1935 as part of a program by Kennecott to expand uses of copper. Outer walls and roofs of the houses are of sheet copper attached to a steel frame while inner walls are plaster on steel laths. Floors of concrete are covered by hardwood. The dwellings are air-conditioned throughout. Extensive use is made of electricity and all lighting, plumbing and hardware fixtures are of brass or copper.

Houses of this type may be had in various architectural designs, and prices, depending on size, range upward from $4,500.—(*Wall Street Journal.*)

● KINGSTON POCAHONTAS COAL COMPANY has awarded a contract to Semet-Solvay Engineering Corporation, 40 Rector Street, New York City, for the design and supervision of the construction of coal washing and preparation equipment for installation at their Exeter mine. The raw coal will be treated by a combination of wet washing and dry cleaning; the domestic sizes to be deashed in a Baum-type jig manufactured by Jeffrey Manufacturing Company; the slack sizes prepared on Stump dry cleaning tables to be furnished by Roberts and Schaefer Company, of Chicago. Dust from dry screens, and transport air from the dry cleaning tables, will pass through dust cleaning apparatus so that the coal dust will be recovered. Sludge recovery from the wet washers will be effected by special equipment of Semet-Solvay design.

Mill, Carson Hill Gold Mining Co., Sonora County, Calif.

● EFFECTIVE August 29, 1936, the Consolidated Coal Company changed its Chicago address from 309 West Jackson Blvd. to 307 N. Michigan Ave., Chicago, Ill.

● THE dark picture of the terrible toll of human life exacted by industrial accidents is brightened somewhat by the record of the training of 73,609 persons in first-aid and mine-rescue methods during the past fiscal year by the United States Bureau of Mines. The total number of persons trained in these humane methods by the Bureau's Safety Division since its creation amounts to 963,-197, consequently the training of the millionth man should be attained within the next few months.

Teluride, Colo.

While it is possible to record but a small proportion of the cases in which this training has been put to practical life-saving effect, the known saving of 60 lives as a result of the training was reported to the Bureau during the year. The saving of 665 human lives as a result of training activities has so far been reported to the Bureau, and it is estimated that an average of 200 lives per year are saved through this work.

The first-aid and mine-rescue training work for the fiscal year was conducted in 489 towns in 33 states. During the year, 188 mines and plants were awarded certificates showing that 100 percent of the employes at such mines and plants had been given training. A total of 1,519 plants has been given 100 percent certificates of first aid, indicating that they have had all of their personnel given the full Bureau of Mines first-aid training course.

During the fiscal year, 844 first-aid instructors' certificates were issued, making a total of 6,543 instructors' certificates issued to date. These first-aid instructors' certificates are greatly prized, as their possession gives a preference in employment in numerous organizations both within and without the mining industry.

During the fiscal year 56 first-aid contests were held in 18 states at which the Bureau's safety men actively assisted; 908 teams involving 5,448 men participated, and almost 109,000 spectators witnessed the contest.

During the year 25 mine explosions in 8 states, 23 mine fires in 14 states, and 38 miscellaneous mine accidents were attended or given special attention. There were but two major disasters, and in these but 17 lives were lost. This is a far more favorable showing than the average of 17 major disasters with average life loss from them per year of 497 in the five-year period before the Bureau of Mines was organized.

The approximately 50 persons in the field service of the Safety Division of the Bureau of Mines came into personal contact with more than 300,000 persons in the mining and allied industries and conveyed to them in one manner or another phases of the safety teachings of the Bureau.

The 29 passenger-carrying automobiles and 14 automobile trucks operated by the Safety Division traveled 562,467 miles without personal injury to anyone.

● HECLA MINING COMPANY has postponed payment of its regular 15-cent quarterly dividend of $150,000, due November 15, until December, according to President James F. McCarthy. Reason for this delay in the announcement, ordinarily made late in October, is the Revenue Act of 1936, which levies a surtax on earnings not distributed in the year in which the earnings are made. Since Hecla declares dividends ordinarily five weeks in advance of payment, distribution on November 15 would cause declaration too early in the year to accurately estimate 1935 earnings to gauge the effect of the surtax, he states.

● STOCKHOLDERS of Callahan Zinc-Lead Company had the option of taking any part of the 350,000 shares of new Callahan stock and they have exercised their option to the extent of 91,000 shares at $1 per share. Frank Eichelberger, new manager of the company, has the right to take the balance of this issue at the same price, and it is said he is prepared to do this at once. This fund of $350,000 will be used under his supervision for the exploration and development of the Galena mine, just west of Wallace, belonging to the Callahan Company.

● THE two major construction enterprises this fall in the Coeur d'Alenes are the 750-ton concentrator to be built at Burke to treat the zinc ores of the Star mine, and the mill which the Hecla Company will build at the Polaris mine to handle the ore of that property. This latter will be a plant of several hundred tons capacity.

The mill to handle the Star product will cost $300,000 and will be built by the Sullivan Mining Company. The Sullivan Mining Company is owned jointly by the Bunker Hill and Sullivan Mining Company and the Hecla Mining Company. Excavation for this plant was started August 1 and construction is to be completed by March 1. The late Frederick W. Bradley is said to have estimated that the Star ore body is sufficient for continuous production for not less than 50 years.

With reference to its Polaris property, plans of the Hecla Company continue to expand and the Polaris ore body seems to grow in size and values. On the 920-ft. level the ore length was 500 ft. and now it is found to be no less than 800 ft. on the next level below.

Sullivan Mining Company is not only putting $300,000 into a new mill to handle the Star ore, but it also is prepared to expend $100,000 for a new hoist to be set on the 1,200-ft. level to lift the ores from the 4,000-ft. Star level. This equipment will be a heavy duty double cylindrical drum style hoist and will have 13,000 lbs. hoisting capacity at a maximum speed of 1,440 ft. a minute.

The predominating Star ore is zinc and the concentrates of the new mill will be treated at the Sullivan Mining Company's electrolytic zinc plant near Kellogg. Incidentally, this zinc plant is already operating at full capacity for the first time in about nine years. The concentrates it treats are coming from the Star mine, from the Hecla mine, from the Bunker Hill mine and from the Sidney mine. Star ore at present is treated at the Hercules mill at Wallace. Star lead concentrates go to the Bunker Hill smelter at Kellogg.

● THE BRULE SMOKELESS COAL COMPANY has awarded contract to the Interstate Equipment Corporation of New York, for a fully automatic aerial tramway to transport coal from their completely mechanized mine at Otsego, Wyoming County, W. Va. The tramway will receive the coal directly from the main slope belt conveyor and transport it overland to the tipple, approximately 4,000 ft. from the mine mouth. The tramway is of the double track cable, open top car type and through an interlocking system of electric control, operates without attendants at either terminal. The initial hourly capacity will be 100 tons. The installation is to be in operation by December 1, 1936.

● A REVISED budget summary for the present fiscal year ending June 30, 1937, which will bring the nation's public debt to a new all-time high of more than $34,000,000,000 was recently made public by the Bureau of the Budget.

The revised summary estimates the gross deficit at the end of the 1936-37 fiscal year at $2,096,996,300. It plans on expenditures of $7,763,000,000. This is a cut of $490,000,000 from the original estimates. The President pointed out, however, that this total may be increased by as much as $500,000,000, which may be requested of the Congress for "recovery and relief." This item is now budgeted at $1,835,000,000. On this basis, estimated rate of expenditure may run above the 1936 figure. Principal reason for the changed outlook of the budget was the revised estimates on receipts. The new figures place expected revenue at $5,660,000,000. This represents an increase estimate of $12,000,000 in revenues this fiscal year.

Briefly, expenditures show a decline of 6 per cent below the January estimates and 12 per cent below last year's actual figures. Revenue increase is figured at 0.2 per cent over the January estimate and nearly 38 per cent better than the 1935-36 receipts.

A brief picture of the Government's financial situation during three years of the New Deal is shown in the following table:

(*In Million of Dollars*)

	1934	1935	1936	1937*	1937†
Receipts	$3,116	$3,800	$4,116	$5,654	$5,666
Expenditures	7,105	7,375	8,880	8,253	7,763
Deficit	3,989	3,575	4,764	2,599	2,097

* Original January estimate.

† Revised September estimate.

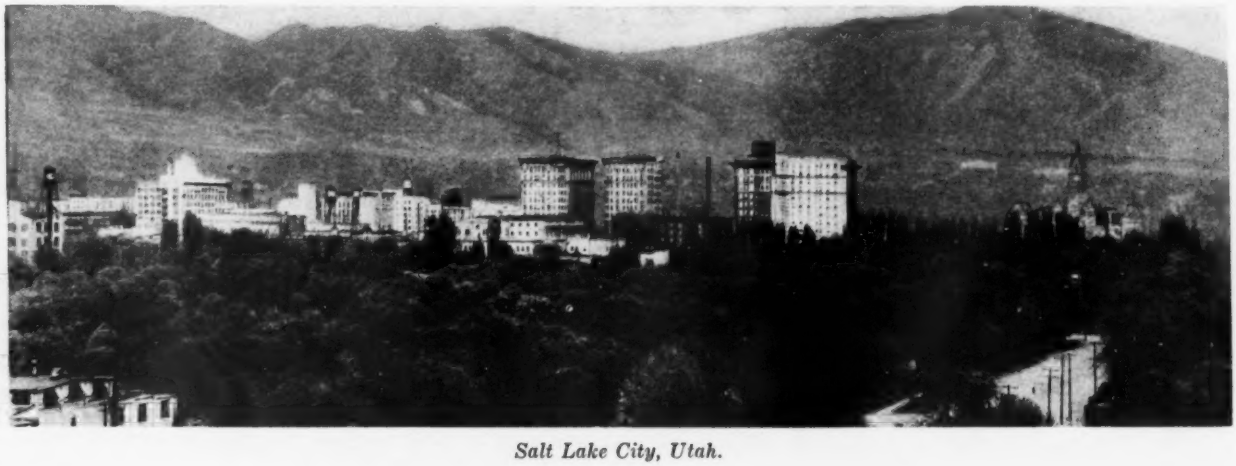
—*From Weekly Bulletin Service, The American Mining Congress.*

● THE Tenth Annual Convention of the National Industrial Stores Association was held at the Hotel Netherland Plaza, Cincinnati, Ohio, September 8, 9, and 10. The headquarters of this organization is the Southern Building, Washington, D. C. Over 1,000 company stores are members of the National Industrial Stores Association, the majority of them operating in the bituminous coal centers. Among the various subjects featured on the program are: Modern trends in food merchandising . . . proper displays . . . modernization of stores . . . merchandising major appliances . . . outside selling, etc. Over 150 merchandise exhibits will also be a feature of the convention.

— *Personals* —

Former President **Herbert Hoover** spent a week at the Madison River Lodge of **W. D. Thornton**, president of Greene Cananea Copper Company.

Dr. Francis A. Thomson, director of the Montana Bureau of Mines & Geology, announces the publication of "Memoir No. 16" of that bureau, covering "Montana Earthquakes of 1935," by Harold W. Scott, of the staff.



Salt Lake City, Utah.

J. P. Williams, president, Koppers Coal Company, addressed the World Power Conference on "Organization of Production, Processing and Distribution of Coal and Coal Products."

Clinton H. Crane, president, St. Joseph Lead Company, is in Europe.

E. R. Price, of the Inland Steel Company, at Wheelwright, Ky., has been named general superintendent, with **J. T. Parker** as superintendent.

Wayne P. Ellis has joined the staff of Appalachian Coals, Inc. Mr. Ellis was prominently identified with the National Industrial Recovery Administration, and its Coal Code.

August Grunert, mining engineer, recently resigned as Montana Supervisor of R. F. C. Mining Loans, to become vice president of the Western Iron Works, at Butte.

George H. Reinbrecht has been appointed coal traffic manager of the Chesapeake & Ohio Railroad Company.

Herbert Hoover will deliver an address at the coming annual meeting of the Western Division, the American Mining Congress.

W. J. Jenkins, president, Consolidated Coal Company, has been vacationing with his family, in Michigan.

L. F. Lumaghi, Jr., who has been in Europe, has returned to his home in St. Louis.

G. Scott Lamb, formerly with the Anthracite Institute, has become associated with Whiteley & Buckalew, Inc., Philadelphia.

H. Foster Bain is now associated with Samuel H. Dolbear and Lawrence H. Wright, mining engineers, 17 Battery Place, New York City.

Tasker L. Oddie has purchased the Nevada Copper group of five mines in Belle Mare Canyon, Nevada.

V. P. Geffine, vice president, Cleveland Cliff Iron Company, was a recent Washington visitor.

Among recent visitors to the Washington offices of the American Mining Congress were **E. L. Kirkwood**, tax department, The Cleveland-Cliffs Iron Co., Cleveland, Ohio; **H. P. Henderson**, president, Texas Smelting & Refining Co., Laredo, Tex.; **Maurice E. Peloubet**, of Pogson, Peloubet & Co., New York, N. Y.; **F. G. Hamrick**, comptroller, American Smelting & Refining Co., New York, N. Y.; and **Horace M. Albright**, president, United States Potash Co., New York, N. Y.

W. L. Bell, manager of the Marietta Mining & Milling Company of Virginia City, Madison County, has been made consulting engineer of the Butte Highlands Mining Company, in the Highland Mountains, south of Butte, where a new cyanide plant was recently constructed.

Dr. E. P. Mathewson, of the University of Arizona, Tucson, formerly manager of the Washoe Smelter of the Anaconda Copper Mining Company and former manager of the British American Nickel Company, visited in Montana in July. At one time he was Montana's foremost civic leader and he was royally entertained while on his visit.

William B. Daly, general manager of mines of the Anaconda Copper Mining Company, Butte, will be active in the program of the American Mining Congress meeting in Denver in September and will preside at one of the sessions.

J. D. Conover, secretary, the American Mining Congress, is again in Washington, after an extended trip which included visits to the important metal mining districts of the West.

—*Died*—

Bruce Clinton Yates, 67, general manager of the Homestake Mining Company and distinguished mining man, died suddenly August 10, at his home, Lead,

S. Dak. On January 1, 1918, he was appointed general manager of the company. In addition to his duties as general manager of the company, he also had charge of the Wyodak coal mine at Gillette, Wyo.

Mr. Yates was a member of many societies, among which are the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Mining Congress, and the National Safety Council, of which he had served as chairman of the mining section. He also held the honorary degree of engineer of mines from the South Dakota School of Mines, at Rapid City.

Edward Julius Berwind, chairman of the board of the Berwind-White Coal Mining Company, director in many corporations, and an internationally known capitalist and patron of the arts, died August 18 after a long illness. His age was 88.

Although having vast interests in railroads, steel, utilities, lumber and other industrial activities, his primary business activity was in the production and marketing of bituminous coal.

President Lincoln appointed Mr. Berwind to the United States Naval Academy in 1865, where he served until 1875, when he was retired for physical disability incurred in line of duty.

After leaving the Navy, Mr. Berwind, with his brother, Charles F. Berwind, and the late Judge Allison White founded Berwind, White & Co. The firm was dissolved in 1886 and the business incorporated under its present name.

At his death he was an officer or director in the Berwind-White Coal Mining Company and its affiliated or subsidiary organizations, the International Telephone and Telegraph Company, in which he was the second largest shareholder among officers and directors, and the Atchison, Topeka & Santa Fe Railroad Company; also the Cuba Company, Consolidated Railroads of Cuba, Cuba Railroad Company, Compañia Cuba, Interborough Rapid Transit Company, International Products Corporation, Postal Telegraph and Cable Company, Northern Insurance Company, and the United States Realty and Improvement Company.

During the World War Mr. Berwind served as an adviser to the United States Fuel Administration and also to other allied countries, notably France. In recognition of his services, France in 1930 made him a Chevalier of the Legion or Honor.

E. L. McIntyre, chief engineer and secretary of the Brown Fayro Company, Johnstown, Pa., died suddenly on the 19th of August from a heart attack. Mr. McIntyre was 48 years of age and had been connected with this company for 12 years.

Davis Laing, one of the pioneer coal operators of West Virginia, died on August 30 at the age of 78 years.

They must improve

COMMUTATION

"YOU CAN SEE THEY'RE BETTER"

● Judgment of brush performance on commutating equipment is based on several factors, but none more important than commutation. A brush, to prove superiority, must improve commutation.

The growing popularity of the "SA" Series of electrographitic brushes is evidence that they DO improve commutation. The grades of this series are graduated in performance characteristics. This permits selection of the grade which will provide good all-round performance, as well as good commutation.

●

An "SA" Series Grade is not "just another brush." It is the product of a carefully planned program of research and engineering development.

●

There is a National Pyramid Brush for every class of service

NATIONAL CARBON COMPANY, INC.

CARBON SALES DIVISION, CLEVELAND, OHIO

Unit of Union Carbide UCC and Carbon Corporation

Branch Sales Offices: New York, Pittsburgh, Chicago, San Francisco

Manganese & Alloy Steel Castings

Manufactured by

WESTERN STEEL CASTING COMPANY

Reduce Operating Costs

More and more mine and mill operators are standardizing on Manganese and Alloy Steel Castings produced by the Western Steel Casting Company for equipment parts that must resist shock and abrasion in order to secure maximum service for each dollar invested and to eliminate costly delays caused by breakdown and maintenance difficulties.

WESTEEL

Roll Shells, Ball Mill Liners, Crusher Jaws, Gears and Pinions, Mine Car Wheels, Etc.

GIVE MAXIMUM SERVICE

Seattle, Washington	145 Horton St.
Tacoma, Washington	1011 Ea. F.
Portland, Oregon	Ft. of Wood St.

. . . Modern Coal Preparation requires . .

- *Modern Tipples*
- *Remodeling Existing Tipples*
- *Crusher Installations*
- *Screening and Mixing Plants*
- *Coal Washeries—Types to Suit Your Requirements*
- *Coal Cleaning by Air Process*
- *Combination Wet and Dry Cleaning Plants*
- *Dedusting Plants*
- *Revolving Dumps*
- *Car Feeders*

Whatever your preparation needs may be, our engineers can find the proper answer. We invite you to make liberal use of our consulting service and testing plant and laboratory.

Roberts and Schaefer Co.

ENGINEERS *and* CONTRACTORS

1110 Wrigley Bldg. CHICAGO, ILL.

3883 Beachwood Blvd. PITTSBURGH, PA. | 514 Ninth Avenue HUNTINGTON, W. VA. | P. O. Box 55 DENVER, COLO.

The Manufacturers Viewpoint

● AN ATTRACTIVE illustrated folder, No. 1569, has been completed by Link-Belt Company, 300 West Pershing Road, Chicago, on its recently announced Speed-O-Matic shovel-dragline-crane.

● BECAUSE of the performance records which O-B automatic d.c. motor starters have been establishing in mines throughout the country, these simple and inexpensive yet fool-proof devices are being given a prominent position in many modernization plans.

And the reason is quite simple. O-B starters for pumps, fans, conveyors and similar equipment were developed especially for mining service. They were designed with the knowledge that they must operate efficiently in wet, dusty locations, where maintenance is difficult and where severe treatment is the rule rather than the exception.

Considering this background, it is only reasonable that repeat orders for O-B starters should be running as high as 90 percent. And anyone knows that the only reason repeat orders are issued is because the original installation was entirely satisfactory.

Just remember that these starters are as new to the mining field as streamlined trains are to the transportation industry, except that the starters have been in service long enough to prove absolutely their ability to reduce costs and increase net profits. Before you complete your modernization plans for 1936, talk over the starter possibilities with your O-B or C-O-B representative.

● INGERSOLL-RAND COMPANY, 11 Broadway, New York, N. Y., recently announced its Type S Diesel engine. This engine is an improved design which is thoroughly modern in all respects. It is of the vertical, four-cycle, single-acting, solid-injection type designed to run at medium speeds and built for heavy-duty, continuous service.

The fundamental design is similar to that of the successful Ingersoll-Rand locomotive engine, of which there are more than 140 in operation. Some of these have been in service for over 12 years.

Type S engines are made with 3, 4, 5, 6, and 8 cylinders for ratings from 150 to 460 hp.

A new 24-page bulletin describing these engines has just been issued. It may be obtained from any Ingersoll-Rand branch office.

● J. M. McKIBBIN has been appointed manager of a newly created sales promotion department, according to an announcement by N. G. Symonds, vice president in charge of sales, of the Westinghouse Electric and Manufacturing Company. All apparatus sales promotion operations excepting those of the company's merchandising department

will be coordinated under the new department's management and the activities of district office sales promotion managers will be directed by Mr. McKibbin. There will be no change in the advertising department, now under the management of R. R. Davis. Mr. McKibbin has been associated with Westinghouse since 1920 and has been sales promotion manager of the Cleveland, Detroit, and Pittsburgh sales offices.

● ALLIS-CHALMERS MFG. COMPANY, Milwaukee, Wis., announces their Bulletin 1478 covering their new low-head horizontal vibrating screen designed especially to permit low head room installations. This screen, available in single, double and triple deck designs up to 6 ft. wide, is described and illustrated in the bulletin, which also contains table-giving sizes, weights and dimensions.

● EFFECTIVE underground illumination, always of first importance to mine operators, will play its part in the exhibit of Mine Safety Appliances Company at booth 95.

All the new developments in Edison electric cap lamps, charging racks, and lamp accessories during the past year will be shown. The complete line (eight different hat and cap styles) of skullgards will be shown, and you will be able to tag just the one that is best suited to your conditions. You will also see all that is new in protective devices for eyes and lungs, equipment for the detection of death-dealing gases, and complete first aid equipment; in short, every safety device for the purpose of reducing preventable accidents. The exhibit will be in charge of those well qualified to make your visit profitable and enjoyable.

● A NEW 24-page illustrated catalog No. 1562, complete with clearance diagrams and dimension tables, has been issued by Link-Belt Company on the company's two distinct types of vibrating screens ("UP" and "PD") for accurately screening such materials as coal, clay, coke, sand, gravel, crushed stone, fertilizer, lime, ore, grain, sugar, chemicals, etc.

A copy of the new book will be sent to any interested reader upon request addressed to Link-Belt Company, 2045 W. Hunting Park Avenue, Philadelphia, or the nearest office of the company.

● EARL D. STEARNS has been appointed sales manager of the Barber-Greene Company, Aurora, Ill. Mr. Stearns, a nationally recognized conveying engineer, has been in charge of engineering sales of this company since 1933.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS. ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

Oliver Building Pittsburgh, Pa.

JAMES H. PIERCE & COMPANY

ENGINEERS AND MINE MANAGERS

A successful background in the practical solution of difficult engineering and managerial problems.

Reports—Valuations—Appraisals—Cost Analysis

Scranton Electric Building, Scranton, Pa.

Whitehall Building, New York, N. Y.

INDEX TO ADVERTISERS

	Page
Allis-Chalmers Mfg. Co.	16
Atlas Powder Co.	18
Colorado Iron Works Co.	15
Du Pont de Nemours Co., E. I.	3
Electric Storage Battery Co.	20
Goodman Manufacturing Co.	17
Hercules Powder Co.	14
Hoffman Bros. Drilling Co.	86
Ingersoll-Rand Co.	21
Link-Belt Co.	10
Loftus, Peter F.	85
Mine Safety Appliance Co.	Back Cover
National Carbon Co.	84
Ohio Brass Co.	8-9
Pennsylvania Drilling Co.	86
Pierce & Co., James H.	85
Roberts & Schaefer Co.	84
Robins Conveying Belt Co.	11
Robinson Ventilating Co.	86
Roebling's Sons Co., John A.	5
Sullivan Machinery Co.	12-13
Timken Roller Bearing Co.	19
Universal Vibrating Screen Co.	86
Western Steel Casting Co.	84
Worthington Pump & Machinery Corp.	22

O. C. Hoffman, Pres. Established 1902. L. H. Hoffman, Treas.

HOFFMAN BROS. DRILLING CO.

—CONTRACTORS—

DIAMOND CORE DRILLING

PUNXSUTAWNEY, PA.

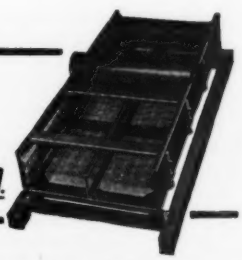
Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed

UNIVERSAL VIBRATING SCREENS

Popular the World Over—Highest in Efficiency. Lowest in Cost. Write for Catalog

UNIVERSAL VIBRATING SCREEN CO.

RACINE — WISCONSIN



ROBINSON

VENTILATING COMPANY

Fans and Blowers

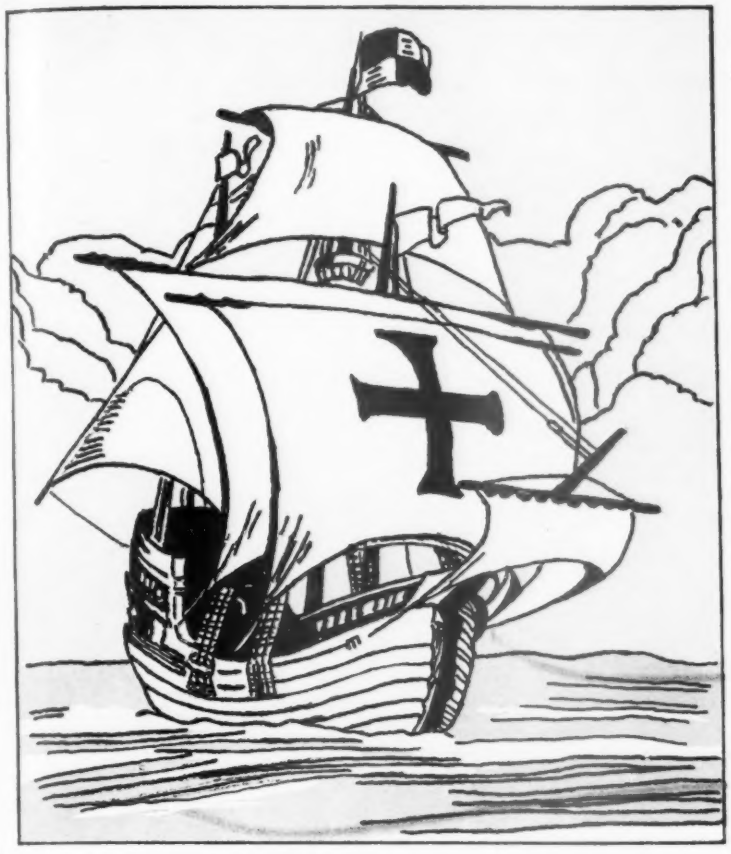
Ventilating Engineering Service

ZELIENOPLE
PENNSYLVANIA

We Look Into the Earth

By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.

Pennsylvania Drilling Co.
Pittsburgh, Pa.
Drilling Contractors



The Search Continues!

. . . Columbus . . . in search of a shorter passage to the Indies . . . discovered by accident a group of small islands off the southeastern coast of America. . . .

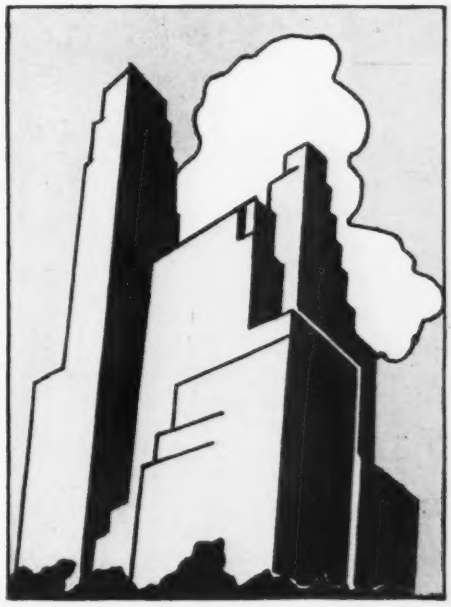
. . . This trip westward into the Atlantic was originated by Spain in a desperate attempt to find a quicker route to the wealth of India. . . .

. . . Cooperation made it a possibility . . . a coordination of resources made it a success. . . .

. . . Today the search continues . . . new frontiers of industry are constantly being opened . . . shorter routes to a vast market of potential wealth are being developed. . . .

. . . The producer, the salesman and the research worker have all joined hands in cooperative effort and coordinated action to assure the success of their undertaking. . . .

. . . No more important agency as an aid to these men exists today than The American Mining Congress. . . . Establish your contact with the mining industry by utilizing its sales-services. . . . Advertise your product in The Mining Congress Journal—The Year Book on Coal Mine Mechanization . . . Exhibit at the Coal and the Metal Mining Expositions. . . .



The American Mining Congress

The choice of the Mining World

EDISON ELECTRIC CAP LAMPS *and* M·S·A SKULLGARDS

From Canada to the Cape, in the coal and metal mines of both the Americas, Edison Electric Cap Lamps are the most widely used miner's lamps made—Skullgards the most popular protective hats and caps. In ever-increasing numbers, they're going to foreign countries, too.

Why? Because Edisons offer the greatest amount of light available in a mine lamp . . . steadier, more reliable, better directed to the job, lower in maintenance cost. Because the rugged strength of Skullgards *really protects*—not only the top, but the front, sides and back of the head as well . . . and each of the eight different styles is light, cool, comfortable, non-conductive to electricity, not softened by mine water or perspiration.

Unquestionably, Edison Electric Cap Lamps and M.S.A. Skullgards rate as two of the factors which have been most powerfully instrumental in reducing the number and severity of accidents in the coal and metal mines of the continent—and in increasing the efficiency and morale of the men. ● Let us send you more information—*better still, let us arrange actual demonstrations for you—without obligation, of course.*

MINE SAFETY APPLIANCES CO.

Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

District Representatives in Principal Cities

M·S·A SAFETY EQUIPMENT

M. S. A. *Products include* Breathing Apparatus . . . Inhalators . . . Comfo Respirators . . . Masks of all Types . . . Gas Indicators . . . Gas Detectors . . . Safety Goggles . . . Protective Hats and Caps . . . Edison Electric Cap Lamps . . . Safety Clothing . . . First Aid Equipment . . . *Descriptive Bulletins will be sent on request*